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American National Standard

for ladders – portable metal – safety requirements

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Revision of
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American National Standard for Ladders — Portable Metal — Safety Requirements

Administrative Co-Secretariat

American Society of Safety Engineers

Co-Secretariat

American Ladder Institute

Approved November 12, 1990

American National Standards Institute, Inc

American National Standard

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Foreword

(This Foreword is not a part of American National Standard A14.2-1990.)

This standard on portable metal ladders is one of six American National Standards prepared under the supervision of American National Standards Committee on Safety in the Construction, Care, and Use of Ladders, A14. All five standard have been developed by subcommittees that report to American National Standards Committee A14. The subcommittees are: A14-1, Portable Wood Ladders; A14-2, Portable Metal Ladders; A14-3, Fixed Ladders, A14-4, Job-Made Ladders; and A14-5, Portable Reinforced Plastic Ladders.

All six standards except A14.7 Mobile Ladder Stands and Mobile Ladder Stand Platforms, standards derive from the original American National Standard Safety Code for Construction, Care, and Use of Ladders, which was first approved on July 25, 1923. Revisions were approved on April 11, 1935, April 2, 1948, and November 10, 1952.

The earlier editions contained some treatment of metal and fixed ladders. Requirements for these types were removed from the 1948 revision because rapid development in the metal ladder field warranted special consideration and treatment of metal ladders and fixed ladders (usually metal) in separate standards.

The Metal Ladder Manufacturers Association is responsible for initiating the standard on portable metal ladders. This group prepared the original draft and submitted it to Standards Committee A14 for consideration in May 1951. Subcommittee A14-2 was then created to review the document and make any changes necessary to conform to the requirements of all the interested groups. After consideration and some revision by the subcommittee, nearly 200 copies of the draft were sent to various organizations and individuals for review and comment. The suggestions received were considered in the preparation of the final draft, which was submitted to the Standards Committee for letter ballot in December 1955 and approved in 1956. The 1972 edition was also developed by Subcommittee A14-2.

Responding to a Consumer Product Safety Commission challenge in August 1975, the A14 Committee mounted a three-prong attack to upgrade the portable ladder standards within the consensus framework of developing standards. Three Task Forces — Anthropometric, Testing, and Labeling — were established in October 1975.

Without question the most massive technically difficult task, which included a significant amount of human-factors work, was carried out by the Testing Task Force. Over 100 known ladder experts were solicited to join this task force and provide their technical expertise. The work involved 50 meetings, over 400 test documents, and the use of numerous test ladders over a period of nearly two years. The cost of the project has been conservatively estimated at over $300,000.

At the August 11, 1977, joint meeting of the Testing Task Force and the A14 Advisory Committee, 23 procedures were presented. These procedures, with an accompanying rationale based upon statistical and human factors data, were distributed to the three protable-ladder subcommittees for review and incorporation into the standards. Recommendations for nomenclature and for care and use of ladders, as well as the Ladder Use Survey Form and Bi-Level Fall Victim Report Form that have been included in the Appendixes, had been previously balloted in order that this more technical material from the Testing Task Force would receive the full attention of the three subcommittees.

Test procedures were developed for three different applications, namely, design verfication, quality control, and in-service testing. Design verification tests would generally be conducted on a one-time basis during the original design development of the product and would usually be destructive tests. Quality control tests would be conducted by the manufacturer on an on- going basis; some of the tests would be destructive and some would be nondestructive. In service tests would be conducted by the user on a periodic basis and would be nondestructive in nature.

The A14 Committee adopted June 4, 1982,* as the effective date of ANSI A14.2-1981, which was approved March 4, 1980. This was to allow the manufacturers the necessary lead time to evaluate their products for conformance to the 1981 edition of the three portable ladder standards, to redesign and test their products where applicable, to design and build the required manufacturing tooling and machinery, and to convert their manufacturing operations to produce the revised products.

In 1981, experience by some of the manufacturers indicated that the inclined load test was not practical when applied to all available length ladders. Also, recommendations were received for clarifications in test procedure descriptions.

In the course of resolving these questions, evidence was produced to warrant modifications in the label test requirements. As a result, it became necessary to postpone the effective date of these standards from June 4, 1982, to October 4, 1982, to allow investigations which brought about the needed changes in label test specifications.

In this current revision, several issues which arose since the last revision are addressed. Most significantly requirements have been developed to cover the multi-purpose articulated ladder. In addition the label/markings section has improved graphics as well as new labels.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Sociey of Safety Engineers, 1800 E. Oakton St., Des Plaines, Illinois 60018

The standard was processed and approved for submmittal to ANSI by American National Standards Committee on Safety in the Construction, Care, and Use of Ladders, A14. Committee approval of the standard does not necessarily imply that all the committee members voted for its approval. At the time it approved this standards, the A14 Committee had the following members:

Lewis W. Berger, Chairman
Thomas F. Bresnahan, Secretary

Organization Represented	Name of Representative
The Aluminum Association	Robert I. Werner
	Peter Pollak (Alt)
American Institute of Architects	Robert H. Lee
American Insurance Association	David P. Winger
Alliance of American Insurers	Harry Winchell
American Ladder Institute	Alan Kline
	Robert I. Werner (Alt)
Associated General Contractors of America, Inc.	Vacant
Association of American Railroads	T. M. Hatchard
Canadian Standards Association	Robert Reid
Edison Electric Institute	David C. Norman
	Matthew Mingoia (Alt)
Exchange Carriers Standards Association	Robert A. Naser
	Jonathan L. Shaw (Alt)
	O. J. Gusella
Industrial Safety Equipment Association	Allen Neustater
	Frank E. Wilcher, Jr. (Alt)
International Brotherhood of Electrical Workers	Manuel A. Mederos
International Brotherhood of Painters & Allied Trades	George J. Jones

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*The original effective date was March 4, 1982.

International Union of Bricklayers & Allied Craftsmen	Albert R. Couillard
Metal Ladder Manufacturers Association	Richard L. Werner
	Jerrold F. Hilton (Alt)
	Richard Sulecki (Alt)
Motor Vehicle Manufacturers Association	Michael Shust
	Kenneth E. Lauck (Alt)
National Association of Architectural Metal Manufacturers	Philip B. Neilson
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National Association of Government Labor Officials	Kenneth J. Zellar
	John Molovich (Alt)
National Fire Protection Association	Samuel C. Cramer
	Ronald Bennett (Alt)
National Retail Federation	Joseph B. Siegel
Steel Plate Fabricators Association	Ward Gill
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Underwriters' Laboratories	Edward Killoren
	William R. Hooper (Alt)
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	Jos. Fandey (Alt)*
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	John E. Johnson
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American National Standard for Ladders - Portable Metal - Safety Requirements

1. Scope and Purpose

1.1 Scope. This standard prescribes rules governing the safe construction, design, testing, care, and use of portable metal ladders of various types including, but not limited to, ladder type step stools, portable extension, step, trestle, articulated, combination, single, and platform ladders, but excluding ladders in and on mines, the fire services, mobile equipment, hoisting equipment, work platforms, antenna communications towers, transmission towers, utility poles, and chimneys. It does not cover special-purpose ladders that do not meet the general requirements of this standard, nor does it cover ladder accessories, including, but not limited to, ladder levelers, ladder stabilizers or stand-off devices, ladder jacks, or ladder straps or hooks, that may be installed on or used in conjuction with ladders.

These requirements are also intended to prescribe rules and minimum criteria for labeling/marking of the kinds of portable ladders cited in this standard, but exclusive of furniture type step stools and special purpose ladders. These labeling/marking requirements do not apply to those situations where training, supervision, or documented safety procedures would be in conflict, or serve in lieu of, these labeling/marking requirements.

1.2 Purpose. The purpose of this standard is to provide reasonable safety for life, limb, and property. In order to develop an effective safety program, the standard may serve also as a basis for purchase requirements and for instruction in personnel training, and in the preparation of motivational/instructional material, such as safety practices, manuals, posters, and the like.

This standard is also intended to provide the manufacturer of metal ladders with a set of minimum performance and dimensional requirements against which his product may be compared. It is not the purpose of this standard to specify all the details of construction of portable metal ladders. The limitations imposed are for the purpose of providing adequate general requirements and testing methods.

2. General

2.1 Rationale. A rationale has been developed covering the performance requirements of this standard.[1]

2.2 Application. This standard is intended for voluntary use by establishments that use, manufacture or evaluate ladders. It is also designed to serve as a guide to federal and state authorities or other regulatory bodies in the formulation of laws or regulations.

The methods employed to ensure compliance with this standard shall be determined by the proper regulatory or administrative authority.

2.3 Interpretation. To secure uniform application of this standard, it is recommended that suggestions involving changes in the requirements or disputes over their interpretation be referred to the following organization:

American Society of Safety Engineers,
1800 East Oakton St., Des Plaines, Ill. 60018.

In view of the many different kinds of ladders and the many different conditions under which they are used, this standard should be liberally construed considering the rationale (see 2.1). In cases of practical difficulty or under special-service conditions, it is expected that the administrative authority will grant exceptions to the literal requirements of this standard or will permit the use of alternate designs or features, but only if equivalent safety is thereby secured.

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[1] The rationale is on file with the Co-Secretariat. American Ladder Institute, 111 East Wacker Drive, Chicago, Ill. 60601

2.4 Mandatory and Advisory Provisions. The word "*shall*" is to be understood as denoting a mandatory requirement. The word "should" is to be understood as denoting a recommendation.

2.5 Equivalent. The word "equivalent" in this standard means a construction, connection, or material providing equal performance.

2.6 Effective Date. The requirements of this standard shall become effective on the date the revised A14.2 standard is approved by ANSI.

3. Related Standards

This standard is intended for use in conjunction with the following American National Standards (see Section 10):

American National Standard Safety Requirements for Scaffolding, ANSI A10.8-1988.

American National Standard for Ladders — Portable Wood — Safety Requirements, ANSI A14.1-1990.

American National Standard for Ladders — Portable Reinforced Plastic — Safety Requirements, ANSI A14.5-1982.

4. Definitions and Nomenclature

angle of inclination. The preferred pitch for portable non-self-supporting ladders.

articulated joint. A hinge which is able to be locked in one or more positions.

articulated ladder. A portable ladder with one or more pairs of locking articulated joints which allow the ladder to be set up in several modes such as a single or extension ladder, with or without a stand-off, as a regular or double front stepladder, scaffold or work table.

back leg (rear rail). The back legs are joined by rear braces to form the back section.

combination ladder. A portable ladder capable of being used either as a stepladder or as a single or extension ladder. It may also be capable of being used as a trestle ladder or a stairwell ladder. Its components may be used as single ladders.

duty rating. The combination of factors, including, but not limited to, ladder type and design features, which imply service capability.

extension ladder. A non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets or the equivalent and so arranged as to permit length adjustment.

extension trestle ladder. A self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable extension section, with a suitable means for locking the ladders together.

highest standing level. The vertical distance, expressed in feet and inches, from the uppermost rung or step the climber is advised to use to the horizontal plane of the ladder base support, with the ladder in the preferred climbing position.

inside clear width. The distance between the inside flanges of the side rails of a ladder.

ladder. A device incorporating or employing steps, rungs, or cleats on which a person may step to ascend or descend.

ladder foot, shoe, or skid-resistant bearing surface. That component of ladder support that is in contact with the lower supporting surface.

ladder type. The designation that identifies the working load.

marking. Any sign, label, stencil, or plate of a primary hazard or informational character, or both, affixed, painted, burned, stamped, or embossed on the ladder surface. (for examples, see Appendixes A and B.)

maximum extended length or maximum working length. The total length of the extension ladder when the middle or intermediate and top or fly sections are fully extended (maintaining the required overlay).

permanent deformation (set). That deformation remaining in any part of a ladder after all loads have been removed.

pitch. The included (acute) angle between the horizontal and the ladder, which is measured on the side of the ladder opposite the climbing side. It is usually expressed as the ratio H/L, which is the horizontal distance *H* from the base of the ladder to the supporting surface divided by the working length *L* of the ladder.

plastic top cap. Injection molded thermoplastic uppermost horizontal member of a portable stepladder.

platform. A landing surface that is used as a working or standing location.

platform ladder. A self-supporting portable ladder of fixed size with a platform provided at the intended highest standing level.

portable ladder. A ladder that can readily be moved or carried, usually consisting of side rails joined at intervals by step, rungs, cleats, or rear braces.

rail. The side members joined at intervals by either rungs, steps, cleats, or rear braces.

rear braces. Crosspieces or diagonals (in the back section of a self-supporting ladder), not intended for climbing, which may be spaced at any interval.

rungs, steps, or cleats. Ladder crosspieces that are intended for use by a person in ascending or descending.

scaffold. A temporary elevated platform and its supporting structure used for supporting worker(s) or materials or both.

section

(1) **bottom or base section.** The lowest section of a non-self-supporting portable ladder.

(2) **top or fly section.** The uppermost section of a non-self-supporting portable ladder.

(3) **middle or intermediate section.** The section between the top (fly) and bottom (base) sections of a non-self-supporting portable ladder.

sectional ladder. A non-self-supporting portable ladder, nonadjustable in length, consisting of two or more sections, and so constructed that the sections may be combined to function as a single ladder.

single ladder. A non-self-supporting portable ladder, nonadjustable in length, consisting of one section.

size. The quantitative description of the length of the ladder. Methods of defining size are presented in the individual standards.

special-purpose ladder. A portable ladder that is either an experimentally designed ladder or a modification or assemblage of A14 approved requirements for design or construction features of one of the general-purpose ladders defined elsewhere in this section, in order to adapt the ladder for special or specific climbing uses.

stand-off. A means by which a ladder may be erected at some horizontal distance away from its upper support point.

stepladder. A self-supporting portable ladder, non-adjustable in length, with flat steps and a hinged base.

step stool (ladder type). A self-supporting, foldable, portable ladder, nonadjustable in length, 32 inches or less in overall size, with flat steps and without a pail shelf, designed to be climbed on the ladder top cap so that the ladder top cap as well as all steps can be climbed. The side rails may continue above the top cap.

step surfaces. The clear portion of steps, rungs, or cleats on which a person may step while ascending or descending a ladder.

test failure. Damage or visible weakening of the ladder structure or a component, except where otherwise defined by the test protocol.

test load. The applied load used to demonstrate compliance with a performance test requirement.

top cap. the uppermost horizontal member of a portable stepladder.

top step. The first step below the top cap of a portable stepladder. Where a ladder is constructed without a top cap, the top step is the first step below the top of the rails.

trestle ladder (double front ladder). A self-supporting portable ladder, non-adjustable in length, consisting of two sections, intended for climbing on both sides simultaneously, hinged at the top to form angles with the base.

unwaxed vinyl tile. In this standard, it shall be the Official Vinyl Composition Tile (OVCT) available from the Chemical Specialties Manufacturers' Association, 1101 Connecticut Ave., Washington, DC 20036.

ultimate failure. The collapse of the ladder structure or, where applicable, a component thereof.

visual damage. Damage evident by visual inspection.

visual inspection. Inspection by the eye without recourse to any optical devices except prescription eyeglasses.

working length. The length of a non-self-supporting portable ladder measured along the rails from the base support point of the ladder to the point of bearing at the top.

working load. Maximum applied load, including the weight of the user, materials, and tools, that the ladder is to support for the intended use.

5. General Requirements

Specific design and construction requirements are minimized in this standard because of the wide variety of metals and design possiblities. However, the design shall have such characteristics as to produce a ladder of sufficient strength and stiffness to meet the performance requirements of this standard and shall produce a ladder without structural defects or accident hazards, such as sharp edges, burrs, and the like.

5.1 Flare. Because of the varied conditions and the wide variety of ladder uses, ladders may be designed with parallel side rails, with side rails varying uniformly in peparation along the length (tapered), or with side rails flaring at the base.

5.2 Side Rails. The design of the side rails shall be such as to ensure a product that will conform to the requirements of this standard.

5.3 Rung and Step Spacing. The spacing between ladder rungs or steps shall be on 12-inch centers ±1/8 inch, except for step stools where the spacing shall be uniform but not less that 8 inches ±1/8 inch nor more than 12 inches ±1/8 inch measured along the side rail. On articulated and combination ladders, the 12-inch spacing shall be maintained across hinged sections.

NOTE: Stepladders with the top step 18 inches below the top cap and the bottom step 6 inches above the base support are permitted as an alternate means of construction. In this case the top step may be used for stepping purposes. When the top step is 18 inches below the top cap, provision should be made to restrict inadvertent stepping into the opening.

5.4 Rung Connections. Rung-to-side rail or step-to-side rail connections shall be so constructed as to ensure sufficient rigidity and strength to conform to the requirements of this standard. All connections shall be riveted, welded, swaged, fastened with a locking type bolt or other permanent means.

5.5 Rungs, Steps, and Platform. Those surfaces of rungs, steps, and platforms designed for use in ascending, descending, working, or standing, shall be corrugated, serrated, knurled, simpled, or coated with a skid-resistant material, across their entire width.

5.6 Hardware. Hardware shall meet the requirements for the ladder's component parts and shall be of a material that is protected against corrosion unless it is inherently corrosion-resistant. Metals shall be so selected as to avoid excessive galvanic action.

5.7 Burrs, Bolts, Rivets, and Welds. All workmanship shall be free from burrs in excess of 1/64 inch.

5.8 Angle of Inclination. The angle of inclination for single and extension ladders, and articulated ladders and combination ladders when used as a single ladder shall be 75-1/2°. The angle of inclination for articulated ladders using rungs, when used as a single or extension ladder, shall be 75-1/2°, but the tread portion is not required to be horizontal. For articulated or combination ladder using steps, this angle may range from 70° to 75-1/2°, to the extent necessary to permit the tread portion of the steps to be horizontal (level).

5.9 Injection Molded Top Caps. Top cap shall be manufactured in a controlled process yielding good commercial workmanship of the part. Finished component shall meet specified dimensions, possess a minimum of shorts or voids, be reasonably free from distortion or warping, discoloration and excessive sink marks or parting line flash.

6. Specifications

6.1 Stepladders

6.1.1 Stepladder Size. Stepladders longer than 20 feet shall not be supplied. The size shall be measured along the front edge of the front side rail, including top cap and foot, with a tolerance of ±1/2 inch. Heavy-duty (type-I) and extra-heavy-duty (type-IA) ladders shall be 3 to 20 feet; medium-duty (type-II) ladders shall be 3 to 12 feet; and light-duty (type-III) ladders shall be 3 to 6 feet in length (see 8.2.1.1).

6.1.2 Slope. Slope is the angle of the side rails or back legs with respect to the vertical and is expressed as the horizontal deviation from the vertical per unit length of the member. Stepladders shall be constructed so that when they are in the open position, the slope of the front section is not less than 3-1/2 inches, and slope of the back section is not less than 2 inches, for each 12-inch length of side rail.

6.1.3 Width and Spread. The minimum clear width between the side rails at the top step shall be 12 inches. The minimum base width shall be determined by providing an overall increase in the spread of a minimum of 1-1/4 inch per foot from the top step to the base, measured along the side rail. From top to bottom the spread between the side rails shall increase a minimum of 1-1/4 inches per foot of side-rail length.

6.1.4 Steps. Steps shall be parallel and level within 1/8 inch (see 5.3).

6.1.5 Step Width. The minimum width of the step or tread shall be 3 inches.

6.1.6 Bucket (Pail) Shelves. Where bucket shelves are an integral part of the stepladder, they shall be so fastened that they can be folded up within the ladder when the ladder is closed (see Section 7.5.5). On ladders 8 feet or less in length, the shelf shall be designed so that it must be folded before the ladder can be closed, or during the closing of the ladder the shelf shall fold and the bucket shelf arms shall not project beyond the front rail frame surfaces facing the user.

6.1.7 Back Section. The back section may be designed with any type of rear braces as long as it meets the general and testing requirements (see Section 7).

6.1.8 Feet. The bottoms of the four rails shall be made of or covered with slip-resistant material. The dimensions of the slip-resistant surface shall not be less than the dimensions of the projected area outlined by the cross-section of the end of the rail.

6.1.9 Spreaders. A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in the open position shall be a component part of each stepladder. The spreader shall not be more than 6-1/2 feet above the lower support surface and shall have all sharp points or edges covered or removed to protect the user. For ladders using double sets of spreaders, the foregoing height limitation applies only to the lower set.

6.1.10 Injection Molded Top Caps. Specification of the particular resin, filler and additives are the responsibility of the molder, who shall give consideration that certain requirements are achieved. All filled thermoplastics shall have the appropriate coupling agent and adequate ultraviolet inhibitors should be incorporated.[1]

The assembled part shall be designed to exhibit satisfactory corrosion resistance, outdoor weathering, thermal stability, and structural integrity under the stipulated thermal conditions outlined in the standard.

6.2 Single and Extension Ladders

6.2.1 Single-Ladder Width. The minimum clear width between side rails shall be not less than 12 inches for ladders 10 feet and under and shall increase 1/8 inch for each additional foot of length.

6.2.2 Extension-Ladder Width. The minimum clear width between side rails of the fly or intermediate section shall not be less than 12 inches. The minimum clear width between side rails at the bottom of the base section shall be not less than the following dimensions:

Ladder Size (feet)	*Minimum Clear Width between Side Rails (inches)*
Up to and including 28	14
Over 28, up to and including 40	15
Over 40, up to and including 72	18

6.2.3 Single-Ladder Size. The size of a single ladder is designated by the overall length at the side rail, exclusing any foot or end cap, with a tolerance of ±1/2 inch. Heavy-duty (type-I) or extra-heavy-duty (type-IA) ladders shall not exceed 30 feet in length; medium-duty (type-II) ladders shall not exceed 24 feet in length; and light-duty (type-III) ladders shall not exceed 16 feet in length.

6.2.4 Extension-Ladder Size. The size of an extension ladder is designated by the sum of the lengths of one side rail of each section measured along the side rails, excluding any foot or end cap. A tolerance of ±3 inches per section shall be allowed. Extension ladders shall not exceed the sizes specified in Table 1.

Extension ladders shall be marked to indicate both the total length of sections and the maximum extended length or maximum working length.

6.2.5 Overlap and Bearing Length. Each section of a multisection ladder, when fully extended, shall overlap the adjacent section by the number of feet indicated in Table 2, with a tolerance of ±2 inches for two-section and ±3 inches for extension ladders other than two-section. A longer overlap is permitted. Bearing length is determined by performance tests.

6.2.6 Overlap Control. Extension ladders shall be equipped in such a manner that the ladder cannot be

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[1] One preferred system is a minimum of 0.25% by weight of HALS (Hindered Amino Light Stabilizer) and 0.12% antioxidant.

Table 1
Extension-Ladder Size

Duty Rating and Type	Two-Section (feet)	Three-Section (feet)
Extra heavy duty - Type IA	Up to and including 60	Up to and including 72
Heavy duty - Type I	Up to and including 60	Up to and including 72
Medium duty - Type II	Up to and including 48	Up to and including 60
Light duty - Type III	Up to and including 32	—

used with an overlap less than the minimum specified in Table 2. Designs employing ladder lock location, mechanical stops, or the equivalent are acceptable, but not those depending upon pulley location.

6.2.7 Extension Locking Device. The extension locking device shall be designed to withstand all performance tests. Locks may be any design, such as gravity, spring-action, rope-operated, or stationary types.

A section incorporating locks that result in the elimination of a rung in the section or one not intended for separate use because of non-compliance with single ladder requirements shall include a permanent marking in letters not less than 1/8-inch high; or a label meeting section 7.6 (labeling tests) may be used:

Caution — This Ladder Section Is Not Designed for Separate Use

or permanently attached stops shall be provided to prevent removal of the section. Permanently attached stops are considered to be those that would require cutting or drilling, or similar forceable means, for removal.

Table 2
Minimum Required Overlap for Extension Ladders

Ladder Size (feet)	Overlap (feet)*	
	Types I and IA	Types II and III
Up to and including 32	3	3
Over 32, up to and including 36	4	4
Over 36, up to and including 48	5	5
Over 48, up to and including 72	6	—

*The tolerance on the overlap is ±2 inches for two-section ladders and ±3 inches for extension ladders other than two-section.

6.2.8 Rope and Pulley

6.2.8.1 Extension ladders may be equipped with a rope and pulley. The pulley shall be attached to the ladder in such a manner as not to weaken either the rungs or the side rails. Fastening means to secure the pulley shall not be construed as weakening the rungs, provided the rungs meet the applicable rung bending strength test.

6.2.8.2 The rope used with the pulley shall be not less than a nominal 5/16 inch in diameter, shall have a minimum breaking strength of 560 pounds, and shall be of sufficient length for the purpose intended. On three-section ladders, on the fly section only, wire cable may be used in the rope and pulley hook-up. The cable shall be not less than 1/8 inch in diameter.

6.2.9 Shoes, Spurs, and Other Anti-Slip Devices. Each rail of a single ladder and each rail of an extension-ladder base section shall be provided with a means of slip resistance secured to the lower end of the ladder rail and designed to function at the specified angle of inclination. Such devices include, but are not limited to, safety shoes, spurs, spikes, conformable shoes, and flat or radiussed tread feet.

6.2.10 End Caps and End Closures. End caps shall be provided on the upper end of each side rail of the fly or intermediate section. End closures or equivalent protection against sharp edges and snagging shall be provided on the bottom of each side rail of the fly or intermediate section when it operates in front of the base section, or on the top of the base section when the fly or intermediate section operates to the rear of the base section. End closures on the bottom of the fly or intermediate sections, when suitably designed in accordance with 6.2.9, may serve as ladder shoes where the unit permits the sections to be taken apart.

6.3 Trestle (Double Front) and Extension Trestle Ladders

6.3.1 Size. Trestle ladders or extension sections, or base sections of extension trestle ladders, shall not be more than 20 feet in length. A tolerance of

+2 inches, -1/2 inch shall apply to all sections. In no case shall the extension-section size exceed the base-section size.

6.3.1.1 Trestle (Double Front) Ladder. The size of a trestle ladder is designated by the length of the side rails measured along the front edge, including the foot or shoe.

6.3.1.2 Extension Trestle Ladder. The size of an extension trestle ladder is designated by the length of the trestle ladder base along the front edge of the side rail, including the shoe, plus the allowable extended length of the extension section measured along its side rail.

6.3.2 Width. The minimum clear width between the side rails of the trestle or extension section at any point shall not be less than 12-1/2 inches. The width spread shall not be less than 1-1/4 inches per foot of side-rail lenth.

6.3.3 Base Spread. The spread when the base section is open shall not be less than 5-1/2 inches per foot of base-section side rail.

6.3.4 Overlap. The extension section of the extension trestle ladder, when fully extended, shall overlap the base section by the number of feet indicated in Table 3, ±2 inches.

6.3.5 Overlap Control. Extension trestle ladders shall be equipped in such a manner that the ladder cannot be used with an overlap less than the minimum specified in Table 3. Designs employing ladder lock locations, mechanical stops, or the equivalent are acceptable.

6.3.6 Extension Locking Device. The extension locking device shall be designed to withstand all load tests.

6.3.7 Spreaders. A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in the open position shall be a component of each trestle ladder. The spreader shall have all sharp points or edges covered or removed to protect the user. When double sets of spreaders are used, the lower set shall not be more than 6-1/2 feet above the lower support surface. On extension trestles where the extension guidance system serves as the spreaders, its location may be more than 6-1/2 feet above the base.

6.3.8 Feet. The bottoms of the four rails of the trestle ladder and the base section of an extension trestle ladder shall be made of or covered with slip-resistant material. The dimensions of the slip-resistant surface shall not be less than the dimensions of the projected area outlined by the cross section of the end of the rail.

Table 3
Minimum Required
Extension Trestle Ladder Overlap

Base Section Size (feet)	Overlap* (feet)
6 up to and including 8	3
Over 8, up to and including 12	4
Over 12, up to and including 16	5
Over 16, up to and including 20	6

*The tolerance on the overlap is ±2 inches.

6.3.9 End Caps and End Closures. End caps shall be provided on the upper end of each side rail of an extension trestle ladder. End closures or equivalent protection against sharp edges and snagging shall be provided on the bottom of each side rail of the extension section. End closures on the bottom of the extension section, when suitably designed, may serve as ladder shoes where the unit permits the sections to be taken apart.

6.4 Platform Ladders

6.4.1 Size. The size of a platform ladder is designated by the overall length as determined by the length of the front edge of the front side rail from the top of the platform to the base of the ladder, including any foot or shoe, with a tolerance of ±1/2 inch. Heavy-duty (type-I) and extra-heavy-duty (type-IA) ladders shall be 2 to 18 feet; medium-duty (type-II) ladders shall be 2 to 10 feet; and light-duty (type-III) ladders shall be 2 to 4 feet in length.

6.4.2 Slope. Slope is the angle of the side rails or back legs with respect to the vertical and is expressed as the horizontal deviation from the vertical per unit length of the member. Platform ladders shall be so constructed that when in the open position, the slope of the front section is not less than 3-1/2 inches, and the slope of the back section is not less than 1 inch, for each 12-inch length of side rail.

6.4.3 Width and Spread. The minimum clear width between the side rails at the platform level shall be 14 inches for type-I, -IA, and -II ladders and 13 inches for type-III ladders. The width spread shall not be less than 1-1/4 inch per foot of side-rail length.

6.4.4 Platform. The platform shall be at least 20 inches below the top of the ladder. The platform area shall not be less than 200 square inches for type-I, -IA, and -II ladders, and not less than 130 square inches for type-III ladders. The platform shall not extend more than 1-1/2 inches beyond the back rail.

Table 4
Combination Ladder Size

Duty Rating and Type	Length in Feet Minimum	Length in Feet Maximum
Extra heavy duty - Type IA	4	10
Heavy duty - Type I	4	10
Medium duty - Type II	4	10
Light duty - Type III	4	6

6.4.5 Top Rail. The back legs and side rails of a platform-type ladder shall extend at least 20 inches of vertical height above the platform and shall be connected with a top member to form a three-sided rail. Equivalent construction may be provided.

6.4.6 Spreaders. Extra spreaders shall be provided on all ladders greater than 6 feet in size. Only ladders 6 feet or under may use the platform hinging device as the spreader if the device locks the ladder open. The spreader shall have all sharp points or edges covered or removed to protect the user. The spreader shall not be more than 6-1/2 feet above the lower support surface. For ladders where double sets of spreaders are used, the foregoing height limitation applies only to the lower set.

6.4.7 Feet. The bottoms of the four rails shall be made of or covered with slip-resistant material. The dimensions of the slip-resistant surface shall not be less than the dimensions of the projected area outlined by the cross section of the end of the rail.

6.4.8 Other Requirements. The requirements of 6.1.1 through 6.1.9 that are not in conflict with 6.4.1 through 6.4.7 shall also apply to platform ladders.

6.5 Combination Ladders

6.5.1 Combination-Ladder Size. When the combination ladder is used as a self-supporting ladder, the size is designated by the length of the ladder measured along the front edge of the front side rail from the bottom of the foot to the top of the top cap, or to the top step when no top cap is used, with a tolerance of ±1/2 inch, and shall be within the limits shown in Table 4.

When the combination ladder is used as an extension ladder, the maximum extended length shall be at least twice the stepladder length less 3 feet. The stepladder length and the maximum extension-ladder length shall be within ±1/2 inch of the size indicated on the label.

6.5.2 Slope. Slope is the angle of the front side rails (stepladder section) or the rear side rails (single- or extension-ladder section) with respect to the vertical and is expressed as the horizontal deviation from the vertical per unit length of the member. Combination ladders shall be so constructed that when the ladder is in the open position for use as a stepladder, the slope of the front section is not less than 3-1/2 inches, for each 12-inch of side rail, and the slope of the back section is not less than 2 inches, for each 12-inch length of side rail.

6.5.3 Width and Spread. The minimum clear width between the front side rails at the top step shall be 12 inches. The minimum clear width between the front side rails measured at the bottom of the side rail shall exceed the minimum clear width at the top step by 1-1/2 inches per foot of side-rail length. The minimum clear width between rear side rails (extension- or single-ladder section) shall be 12 inches.

6.5.4 Steps and Rungs. Either steps or rungs may be used on the front and rear sections. Step surfaces shall be parallel and level within ±1/8 inch. When steps are used in the rear section, the step surfaces shall be parallel within ±1/8 inch with the step surfaces in the front section when the ladder is used as a single or extension ladder.

6.5.5 Step Width. Where used, the minimum width of the step in the front section only (stepladder section) shall be 3 inches.

6.5.5 Bucket Shelves. Where bucket shelves are an integral part of the combination ladder, they shall be so fastened that they can be folded up within the ladder when the ladder is closed (see Section 7).

6.5.7 Feet. The bottoms of the four rails shall be made of or covered with slip-resistant material. The dimensions of the slip-resistant surface shall not be less than the dimensions of the projected area outlined by the cross section of the end of the rail.

6.5.8 Spreaders. A metal spreader or locking device of sufficient size and strength to securely hold the front and rear sections in the open position shall be a component part of each combination ladder. The spreader shall have all sharp points or edges covered or removed to protect the user. The spreaders shall not be more than 6-1/2 feet above the base supporting surface.

6.5.9 Extension Locking Device. The extension locking device shall be designed to withstand all load tests without test failure (see Section 7.3.4.1.2.2).

6.5.10 Stops. Combination ladders shall be equipped in such a manner that the ladders, when used as extension ladders, shall not exeed the maximum working lengths specified by the manufacturer. Designs employing ladder lock location, mechanical stops, or the equivalent are acceptable.

6.5.11 End Caps. End caps shall be provided on the upper ends of each side rail of a comination section when the rail is not otherwise capped.

6.6 Step Stools (Ladder Type)

6.6.1 Size. Step-stool size is measured along the front edge of the front side rail, including the top cap and feet, with a tolerance of ±1/2 inch. The front side rails may continue around and over the top cap, but such side-rail extension is not considered part of the ladder size.

6.6.2 Slope. Slope is the angle of the side rails or back legs with respect to the vertical and is expressed as the horizontal deviation from the vertical per unit length of the member. Step stools shall be constructed so that when in the open position, the slope of the front section is not less than 4 inches, and the slope of the back section is not less than 2-1/2 inches, for each 12-inch length of side rail.

6.6.3 Width and Spread. The minimum clear width between side rails at the top step shall be 10-1/2 inches. The minimum outside width at the top cap shall be 12 inches. From top to bottom the spread between the side rails shall increase a minimum of 1-1/4 inches per foot of side-rail length.

6.6.4 Steps. Steps shall be parallel and level within the tolerance specified (see 5.3). Excluding the interval between the bottom step and the support surface, the steps and top cap shall be uniformly spaced at intervals of 8 to 12 inches.

6.6.5 Step Width. The minimum width of the step or tread shall be 3 inches.

6.6.6 Back Section. The back section may be designed with any type of rear braces as long as it meets the general and test requirements. (See Section 7.)

6.6.7 Feet. The bottoms of the four rails shall be made of or covered with slip-resistant material. The dimensions of the slip-resistant surface shall not be less than the dimensions of the projected area outlined by the cross section of the end of the rail.

6.6.8 Spreaders. A metal spreader or locking device of sufficient size and strength to securely lock the front and back sections in the open position shall be a component part of each step stool. All sharp points or edges shall be covered or removed to protect the user.

6.6.9 Top Cap. The top cap shall be of sufficient strength and slip resistance to permit its use as a climbing surface. Its size shall be not less than 12 inches wide and 4-3/4 inches deep. The top cap shall not overhang the ladder in any direction in excess of the dimensions of the attaching hardware or the equivalent. The top cap shall not be split for folding the ladder.

6.7 Articulated Ladders.

6.7.1 Articulated-Ladder Size. When the articulated ladder is used in a stepladder mode, the size is designated by the length of the ladder measured along the front edge of the front side rail from the bottom of the foot to the center of the pivot pin of the hinge, with a tolerance of ±1/2 inch. Heavy-duty (Type-I) and extra-heavy-duty (Type-IA) ladders shall be 3 to 15 feet; medium-duty (Type-II) ladders shall be 3 to 12 feet; and light-duty (Type-III) ladders shall be 3 to 6 feet in length (see 8.1.1.1).

When the articulated ladder is used in a single or extension ladder mode, the size is designated by the overall length at the side rail, including any foot, with a tolerance of ±1/2 inch. Heavy-duty (Type-I) or extra-heavy-duty (Type-IA) ladder shall not exceed 30 feet in length; medium-duty (Type-II) ladders shall not exceed 24 feet in length; and light-duty (Type-III) ladders shall not exceed 12 feet in length.

6.7.2 Slope. Slope is the angle of the front side rails or the rear side rails with respect to the vertical and is expressed as the horizontal deviation from the vertical per unit length of the member. Articulated ladders shall be so constructed that when the ladder is in the open position for use in the stepladder mode, the slope of the front section is not less than 3-1/2 inches, and the slope of the back section is not less than 2 inches, for each 12-inch length of back rail.

If the ladder permits use in the double front stepladder mode, the spread when the ladder is open shall not be less than 5-1/2 inches for each 12-inch length of side rail.

6.7.3 Width and Spread. The minimum inside clear width between the front side rails at the top step when set up in a stepladder mode shall be 12 inches. If the ladder is provided with a straight back section, then the front section's minimum outside width at the bottom support shall exceed the width at the top of the rails by 1-1/2 inches per foot of ladder length when measured to the outside of the top side rails. If the ladder is provided with both a front and back section which spread, then both sections' minimum outisde width at the bottom support shall exceed the width at the top of the rails by 1-1/4 inches per foot of ladder length when measured to the outside of the top side rails. The minimum inside clear width at the base when set up in a single or extension ladder mode shall be 12 inches for ladders 10 feet and under and the minimum inside width shall increase 1/8 inch for each additional foot of length.

6.7.4 Steps and Rungs. Either steps or rungs may be used on the front and rear sections. Step surfaces shall be parallel and level within ±1/8 inch. When steps are used in the rear section, the step surfaces shall be parallel within ±1/8 inch with the step surfaces in the front section when the ladder is used in a single or extension ladder mode.

6.7.5 Step Width and Rung Diameter. If steps are used, the minimum width of a step shall be 3 inches. If rungs are used, they may be round, obround, trapezoidal, square, or rectangular. Round rungs shall have a minimum diameter of 1-1/8 inches. Trapezoidal, obround, square or rectangular rungs shall have a step surface of not less than 1 inch, either flat or along a segment of arc of 3 inches or greater radius. Right-angle or near-right angle corners shall have their edges rounded to a radius of not less than 1/16 of an inch.

6.7.6 Bucket Shelves. Where bucket shelves are provided they shall be in compliance with Section 6.1.6 and 7.5.5 test requirements.

6.7.7 Feet. The bottoms of the four rails shall be made of, or covered with, slip-resistant material. The dimensions of the slip-resistant surface shall not be less than the dimensions of the projected area outlined by the cross section of the end of the rail. The tread surface may be a radius.

6.7.8 Articulated Joints. The joints, and the joint to side rail connections shall be so constructed as to ensure sufficient strength and rigidity to conform to the requirements of this standard. The joints shall have set locking positions to allow set up at the proper angles designated by the manufacturer. All sharp points or edges or pinch points shall be covered or removed to protect the user. Each lock shall visibly indicate whether it is locked or unlocked.

6.7.9 Work Table Position. Use as a work table shall be limited to working heights of 5 feet or less. The manufacturer shall supply suggestions for an appropriate decking for safe usage.

6.7.10 Telescoping Sections. The locks for any telescoping sections shall visibly indicate as to whether they are locked or unlocked.

6.7.11 Scaffold Position. Use as a scaffold shall be based on a minimum one man usage (250 lb. including equipment). The manufacturer shall supply or suggest an appropriate decking for safe usage. Working heights shall be limited to 6 feet or less. The height shall not exceed 3 times the minimum outside width of the bottom support in the scaffold position. Hand rails and toeboards are not required.

7. Test Requirements

7.1 General

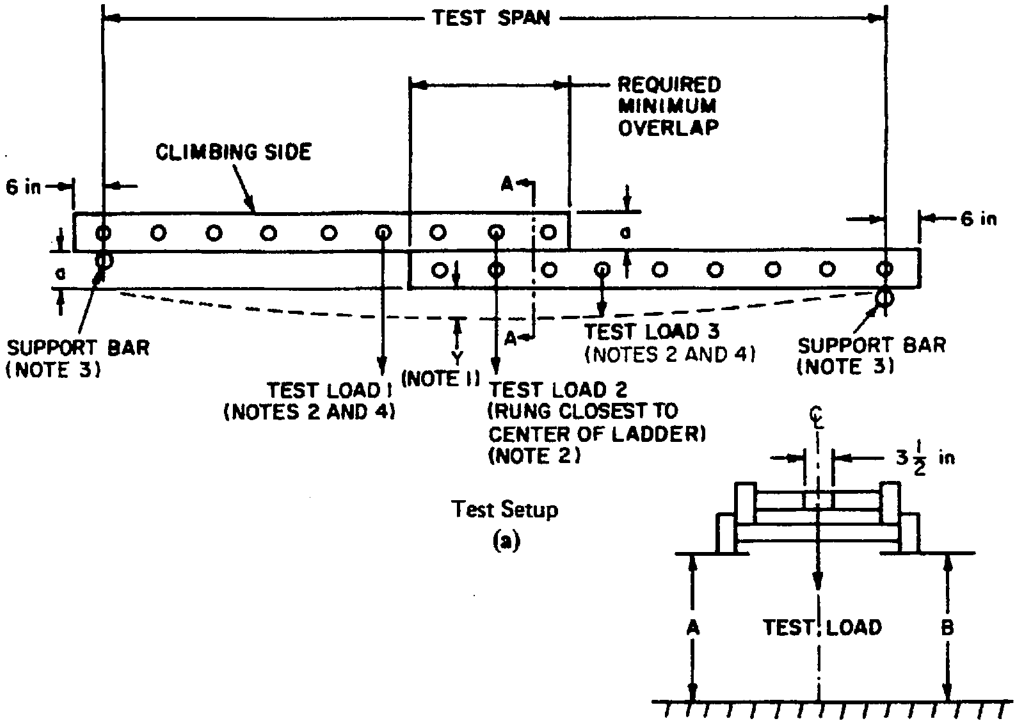
7.1.1 The test methods depicted in this section represent the preferred methods to be followed in determining whether a ladder conforms to the requirements of this standard. Variations from the specific methods depicted in the various diagrams shall be acceptable provided such alternate means provide equivalent results and comply with the intent of the applicable preferred test method. However, where the supposed equivalent test methods yield different results, the preferred test methods shall determine whether or not the ladder is in conformance with the standard.

7.1.2 The test requirements were developed using statistical tolerances. Hence, where a single test result indicates noncompliance, the test may be repeated utilizing a statistically justifiable number of test samples to ultimately determine compliance or noncompliance with the standard.

7.1.3 Many of the tests required by the standard are inherently dangerous. The American National Standards Institute, the A14 Committee, the A14 Subcommittees, and the A14 Task Forces neither assume nor accept any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the manufacturer, an outside laboratory or consultant, the user or owner of the product, or any other individual or organization, and whether or not any equipment, facility, or personnel for or in connection with the test is furnished by the manufacturer or by any other such individual, consultant, laboratory, or organization. Extreme care shall be exercised to avoid personal injury when setting up and conducting the tests and when disassembling the test gear at the conclusion of the tests.

7.1.4 Diligent effort and close attention to all details shall be exercised in setting up and conducting the tests. Subtle variations in test techniques may introduce significant testing errors that bias the testing program. Personnel inexperienced in ladder testing, even though otherwise professionally qualified, should be especially careful to follow the preferred test methods.

7.1.5 Design verification tests shall be conducted during the initial evaluation of a specific product design and thereafter whenever there is a change in the design, method of manufacture, or material. It is not intended that design verification tests shall be conducted on ladders that have been in use or subjected to prior damage, misuse, or abuse. Ladders



Test Setup
(a)

Section A-A
(b)

NOTES:

(1) y = deflection of the ladder under load.

(2) The ultimate test load shall be applied at three different locations: (a) to the center of the highest base rung below the overlap (test load 1); (b) to the center of the fly rung in the center of the overlap or, if necessary, 6 inches higher than the center of the ladder span (test load 2); and (c) to the center of the lowest fly rung above the overlap (test load 3). The deflection test load, which is applied before the ultimate test load, shall be applied only to the center of the rung nearest the center of the test span (test load 2).

(3) The support bars shall have a nominal radius of 1 inch.

(4) This test is illustrated for a ladder design in which the fly section is behind the base section, shown here with the base section on the left. For the alternative design in which the base section is behind the fly section, the base should be on the right, and test load positions 1 and 3 would be reversed.

(5) Auxiliary means that do not increase the strength of the ladder may be used to ensure that the ladder locks remain engaged during the test to prevent translation of the fly section relative to the base section during the test.

Fig. 1
Horizontal Bending Test

subjected to design verification tests are not intended for subsequent use.

7.1.6 Quality control tests should be conducted during the manufcturing process employed to produce the ladder. Such tests normally shall not be conducted on every ladder manufactured or on ladders that have been in use or subjected to prior damage, misuse, or abuse. Certain quality control tests, such as dimensional verifications, hardness, chemistry, spectroscopic, and mechanical-properties tests may be conducted on ladders subsequent to their use when done with extreme care by properly qualified professionals following applicable ASTM standards for such tests, where proper recognition is given to the influence on the test results of the prior use and the test method itself. Except where the quality control tests are destructive in nature, ladders subjected to quality control tests may be subsequently placed into field service.

7.1.7 In-service tests may be conducted in the field by the manufacturer, the actual owner, the user, or their agents to evaluate the condition of the product following actual field service. Ladders that conform to the in-service use tests shall continue to be employed.

NOTE: The tests in italics are advisory, not mandatory, when conducted for in-service teting purposes.

7.1.8 The development and ongoing implementation of overall quality control shall be the responsibility of each individual manufacturer.

Table 5
Horizontal Bending Test Loads*

Duty Rating and Type	Working Load	Preload	Deflection Test Load	Ultimate Test Load
Extra heavy duty -Type IA	300	225	300	375
Heavy duty - Type I	250	188	250	310
Medium duty - Type II	225	169	225	280
Light duty - Type III	200	150	200	250

*All quantities are in pounds.

Table 6
Maximum Allowable Average Deflections for Horizontal Bending Test

	Maximum Working Length (Size less Minimum Overlap)*		
Ladder Size (feet)	Two-Section (feet)	Three-Section (feet)	Maximum Average Deflection (inches)
12	9	—	3.6
14	11	—	5.2
16	13	—	6.8
20	17	—	10.0
24	21	—	13.2
28	25	—	16.4
32	—	26	17.4
32	29	—	19.6
36	—	28	20.6
36	32	—	22.8
40	—	30	22.6
40	35	—	26.0
44	—	34	26.0
44	39	—	29.2
48	—	38	29.2
48	43	—	32.4
52	—	40	31.2
52	46	—	35.6
56	—	44	34.4
56	50	—	38.8
60	—	48	38.6
60	54	—	42.0
64	—	52	41.2
68	—	56	44.5
72	—	60	47.9

*For single ladders use column for maximum working length for two-section extension ladder.

7.1.9 Conformance to the design verification test requirements shall be determined 5 minutes after load removal, where applicable.

7.1.10 The test load shall be applied slowly, using care to avoid impact loading during the test.

7.1.11 The unwaxed vinyl floor tile shall be the Official Vinyl Composition Tile (OVCT) available from the Chemical Specialties Manufacturers Association, 1001 Connecticut Ave. NW, Washington, DC 20036.

7.2 Combination Ladder Tests. Combination ladders shall comply with the test requirements for stepladders when in the stepladder position, and for extension ladders when in the extension-ladder position. The 75-1/2° angle of inclination for extension ladders shall be modified when applied to combination ladders in their extension-ladder orientation to the extent necessary to permit the tread portion of the steps to be horizontal (level).

7.3 Single, Extension, Combination, and Articulated Ladder Tests

7.3.1 Horizontal Bending Test

NOTE: This is a design verification test.

7.3.1.1 The ladder shall be placed in a flat, horizontal position, as shown in Fig. 1a. When extension and combination ladders are tested, the unit shall be opened to the required overlap and extended to its maximum working length. When an articulated ladder is being tested it shall be set up at its maximum length in the extension ladder mode.

The unit shall be loaded with the preload shown in Table 5, which shall be held for a minimum period of 1 minute and then unloaded.

After preloading, a deflection test load in accordance with Table 5 shall be applied equally to both side rails. The load shall be applied to the center of the rung nearest to the center of the test span, over a 3-1/2 inch length of the rung, as shown in Fig. 1b. Vertical measurements shall be taken of both rails before and during loading, and after the load is removed. The maximum average deflection of both side rails shall not exceed the value given in Table 6.

7.3.1.2 The ladder shall then be subjected for at least 1 minute to an increased load equal to the ultimate test load in accordance with Table 5. The ladder shall sustain the ultimate test load without ultimate failure. The test load shall be sequentially applied at three different rung locations: first to the center of the highest base rung below the overlap; second to the center of the fly rung in the center of the fly rung in the center of the overlap or, if necessary, 6 inches higher than the center of the ladder span; and third to the center of the lowest fly rung above the overlap. When testing an articulated ladder, the test load shall be applied to the center of the rung immediately above the center of the test span. When the articulated ladder is intended to be climbed from either side, the horizontal bending test shall be conducted front and back. The end support bars shall be designed to permit longitudinal translation of either one or both supports during loading as the test unit deflects, yet still maintain the 6-inch overhang at each end.

7.3.2 Deflection Test

NOTE: This is both a design verification test and an in-service use test.

The ladder shall be supported and the load shall be applied to the rung closest to the midpoint of the test span, over a 3-1/2-inch bearing on the rung, as shown in Fig. 2a and b. All supporting and loading apparatus shall conform to that shown in Fig. 2. The test results shall be recorded on a data sheet that contains at least the minimum data shown in Fig. 3, or the equivalent.

The ladder shall be preloaded with a 30-pound load for 1 minute before applying the test load. The test load shall be applied for a period of 1 minute, in accordance with Table 7.

Deflections shall be determined by measuring, at the midpoint between the supports, the vertical distance from the extreme outside edges of the widest section of both rails to the floor or other reference surface both before loading and while the full test load is applied. These measurements shall be entered on the data sheet (see Fig. 3). The test shall be repeated with the load applied to the other rail of the ladder. The twist angle between a line joining the loaded and unloaded rails and the horizontal shall be calculated from the trigonometric equation:

$$\alpha = \textit{arc sine}\left(\frac{\textit{difference in deflection of rails}}{\textit{outside width of widest section}}\right)$$

$$= \textit{arc sine}\left(\frac{A-B}{W}\right)$$

The ladder shall pass this test without exceeding the values of deflection and angle of twist shown in Table 8.

7.3.3 Simulated In-Use Inclined Load Test

NOTE: This is a design verification test.

The ladder shall be the maximum usable length fully extended and supported as shown in Fig. 4. The load shall be applied equally to both side rails on the lowest fly rung above the overlap using two 3-1/2-inch straps, each located next to a rail and centrally loaded through an equalizer bar over the climbing side of the ladder. All supporting and loading apparatus shall conform to that shown in Fig. 4.

The ladder shall be loaded in accordance with Table 9. The full load shall be applied for a period of 1 minute before release. The ladder shall sustain this load without ultimate failure. Permanent deformation (set) shall be allowed.

This test shall be used only for design verification. It shall not be employed for quality control or field inspection purposes.

7.3.4 Hardware Test Requirements

7.3.4.1 Column and Hardware Load Test

NOTE: This is a design verification test.

7.3.4.1.1 Single and Extension Ladders. The test unit shall either be the shortest full-size ladder manufactured or a unit merely of sufficient length for

Table 7
Deflection Test Loads

Duty rating and Type	Deflection Test Load (pounds)
Extra heavy duty - Type IA	70
Heavy duty - Type I	60
Medium duty - Type II	55
Light duty - Type III	50

Table 8
Deflections and Angles of Twist

Single* and Extension Ladders			Combination Ladders						
Size of Ladder (feet)	Maximum Working Length (Size less Minimum Overlap) (feet)		Maximum Working Length (feet)	Maximum Deflection Y of Loaded Rail† (inches)		Twist Angle α ‡ (degrees)		Sine α	
	Two-Section*	Three-Section		Extension Ladder	Combination Ladder	Extension Ladder	Combination Ladder	Extension Ladder	Combination Ladder
—	—	—	7	—	1.00	—	2.1	—	0.03664
—	—	—	8	—	1.20	—	2.3	—	0.04013
—	—	—	9	—	1.40	—	2.5	—	0.04362
—	—	—	10	—	1.60	—	2.6	—	0.04536
14	11	—	11	1.00	1.80	2.90	2.8	0.05059	0.04885
15	12	—	12	1.25	2.15	3.00	3.1	0.05234	0.05408
16	13	—	13	1.50	2.35	3.10	3.3	0.05408	0.05756
17	14	—	14	1.75	2.50	3.20	3.4	0.05582	0.05931
18	15	—	15	2.00	2.80	3.30	3.5	0.05756	0.06105
20	17	—	17	2.50	3.10	3.50	3.6	0.06105	0.06279
22	19	—	19	3.00	3.40	3.70	4.0	0.06453	0.06976
24	21	—	—	3.50	—	3.90	—	0.06802	—
28	25	—	—	4.50	—	4.30	—	0.07498	—
32	29	26	—	5.50	—	4.70	—	0.08194	—
36	32	28	—	6.50	—	5.10	—	0.08889	—
40	35	30	—	7.50	—	5.50	—	0.09585	—
44	39	34	—	8.50	—	5.90	—	0.10279	—
48	43	38	—	9.50	—	6.30	—	0.10973	—
52	46	40	—	10.50	—	6.70	—	0.11667	—
56	50	44	—	11.50	—	7.10	—	0.12360	—
60	54	48	—	12.50	—	7.50	—	0.13053	—
64	—	52	—	13.50	—	7.90	—	0.13744	—
68	—	56	—	14.50	—	8.30	—	0.14436	—
72	—	60	—	15.50	—	8.70	—	0.15126	—

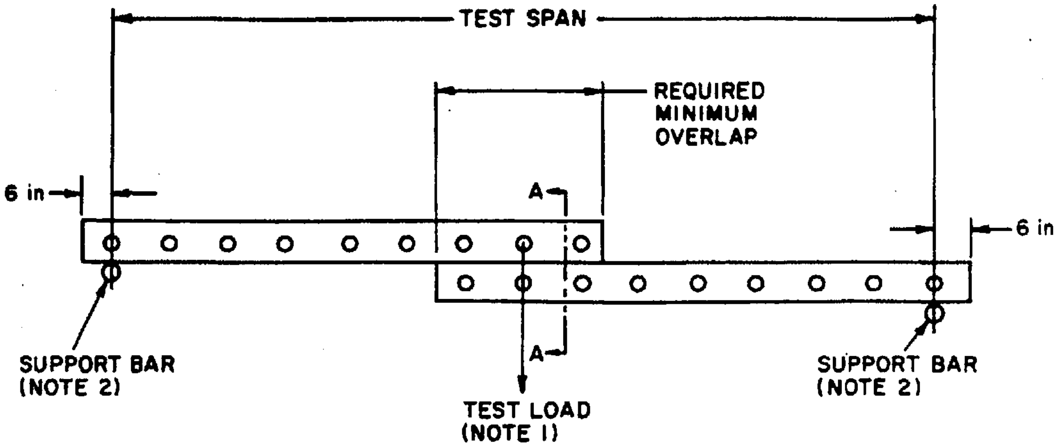
* For single ladder use column for maximum working length for two-section extension ladder.

† $Y = 0.25X - 2.5$, where Y = maximum deflection of loaded rail (inches) and X = maximum working length or size of ladder (feet).

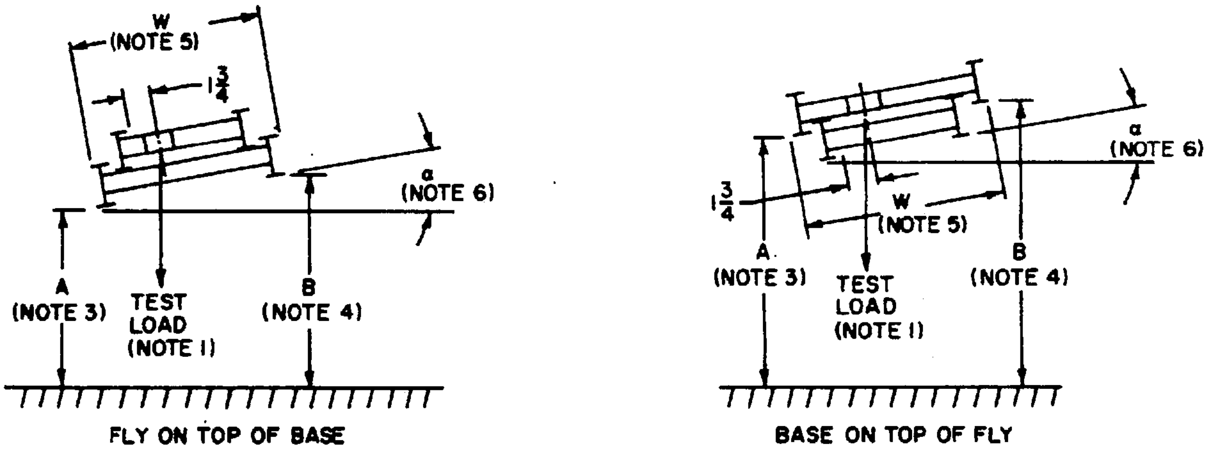
‡ $\alpha = 0.10X + 1.50$, where α = twist angle (degrees) and X = maximum working length or size of ladder (feet).

test purposes. If a full-size ladder is used, the fly section shall be extended a minimum of one rung beyond the minimum working length of the ladder. Short test units shall consist of portions of the base and fly sections of the extension ladder with all the hardware or fittings attached.

The unit shall be placed at a 75-1/2° working angle, as shown in Fig. 5, with both locks engaged. A downward distributed load, in accordance with Table 10, shall be applied for a period of one minute, equally to both side rails on the lowest fly rung above the overlap, using two 3-1/2-inch straps, each located next to a



Test Setup
(a)



Section A-A
(b)

NOTES:

(1) The test load shall be applied to the rung closest to the midpoint of the test span over a 3-1/2-inch bearing on the rung.
(2) The support bars shall have a nominal radius of 1 inch.
(3) *A* = vertical height of loaded rail.
(4) *B* = vertical height of unloaded rail.
(5) *W* = width of widest ladder section.
(6) α = angle of twist.
(7) Auxiliary means that do not increase the strength of the ladder may be used to ensure that the ladder locks remain engaged during the test to prevent translation of the fly section relative to the base section during the test.

Fig. 2
Deflection Test

DATA SHEET

Company: ______

Date of test: ______

Recorded by: ______

Type of ladder: Single ______ Extension ______ Combination ______

Code name: ______

Ladder size: ______

Length of test span: ______

Width of widest section, *W*: ______

Rated load of ladder: 200 lbs ______ 225 lbs ______ 250 lbs ______ 300 lbs ______

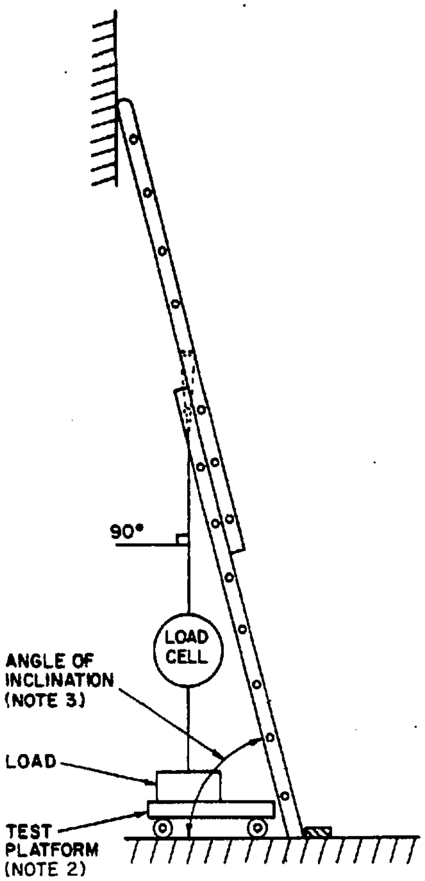
Vertical Readings	Deflection at No Load (inches)	Deflection at ______ lb Load (inches)	Actual Deflection due to Load (Column 2 – Column 1) (inches)	Difference in Actual Deflection, $A-B$ (inches)
Right-hand loaded				
A				
B				
Left-hand loaded				
A				
B				

	Right rail loaded	Left rail loaded
Angle of twist $\alpha = \text{arc sine } \frac{A-B}{W}$ =	______	______
Allowable angle of twist (Table 8) =	______	______
Deflection of loaded side rail =	______	______
Allowable deflection (Table 8) =	______	______

Remarks:

NOTE: This is a suggested format for a data sheet used to record test results from the deflection test.

Fig. 3
Deflection Test Data Sheet



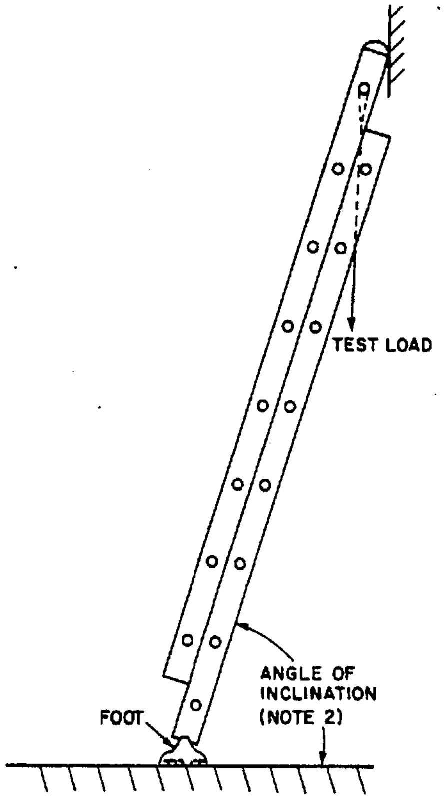
NOTES:

(1) This illustration shows the test setup before the load is applied.

(2) The test platform follows the test load as the ladder deflects into the wall.

(3) The angle of inclination shall be 75-1/2°, except that for combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

Fig. 4
Inclined Load Test



NOTES:

(1) The fly section may be located either to the front or to the rear of the base section.

(2) The angle of inclination shall be 75-1/2°, except that for combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

(3) Both locks shall be engaged for the column and hardware load test (7.2.4.1); for the single lock load test (7.2.4.2), one lock shall be engaged and the other lock removed.

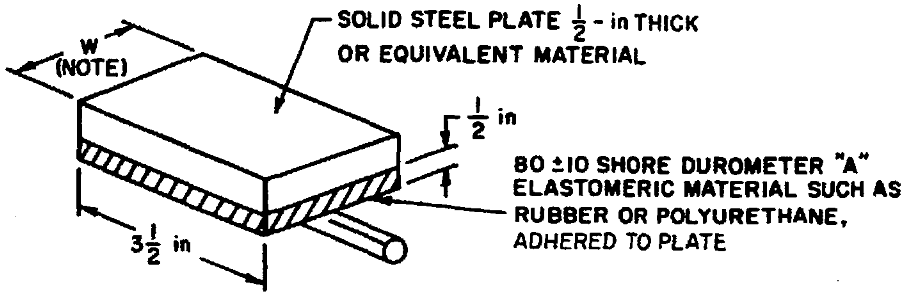
Fig. 5
Column and Hardware Load Test and Single Lock Load Test

Table 9
Simulated In-Use Inclined Load Test

Duty Rating and Type	Working Load (pounds)	Test Load (pounds)
Extra heavy duty - Type IA	300	1000
Heavy duty - Type I	250	1000
Medium duty - Type II	225	900
Light duty - Type III	200	800

Table 10
Hardware Tests

Duty Rating and Type	Column and Hardware Test Load (pounds)	Single Lock Test Load (pounds)
Extra heavy duty - Type IA	1200	1000
Heavy duty - Type I	1000	1000
Medium duty - Type II	900	900
Light duty - Type III	800	800


W (NOTE)
SOLID STEEL PLATE $\frac{1}{2}$ - in THICK OR EQUIVALENT MATERIAL
$\frac{1}{2}$ in
80 ±10 SHORE DUROMETER "A" ELASTOMERIC MATERIAL SUCH AS RUBBER OR POLYURETHANE, ADHERED TO PLATE
$3\frac{1}{2}$ in

NOTE: *W* = width of step or rung plus 1 inch.

Fig. 6
Standard Loading Block

rail and centrally loaded through an equalizer bar over the climbing side of the ladder. Permanent deformation in other parts of the ladder structure due to the test is not a test failure. However, the ladder shall still support the test load after the application of the load, even if the rung assumes permanent deformation (set).

7.3.4.1.2 Combination Ladders. The test unit shall be a full-size ladder. The extension section shall be extended a minimum of one rung or step beyond the minimum working length of the ladder. The unit, set up as an extension ladder as shown in Fig. 5, shall be placed against a vertical support, with both locks engaged at an angle of 75-1/2°.

A downward distributed load, in accordance with Table 10, shall be applied for a minimum period of 1 minute on a standard loading block (see Fig. 6) resting on the center of the highest fly rung or step, or by means of a 3-1/2-inch strap over the rung on the climbing side of the ladder. During the test, the tread portion of the steps on the front rail section shall be parallel to the ground. If the treads are used on the single- or extension-ladder section, these treads shall also be parallel to the ground. The unit shall withstand this test with no permanent deformation (set) or other visible weakening of the structure.

7.3.4.1.3 Articulated Ladders. The test unit shall be a full size ladder. If equipped with an extension section, it shall be extended a minimum of one rung or step beyond the minimum working length of the ladder. The unit shall be set up as an extension or single ladder and placed against a vertical support, with all locks engaged.

The ladder shall be placed at a 75-1/2° working angle. A downward distributed load, in accordance with Table 10, shall be applied for a period of 1 minute, equally to both side rails on the highest rung, using two 3-1/2-inch straps, each located next to a rail and centrally loaded through an equalizer bar over the climbing side of the ladder. Permanent deformation in other parts of the ladder structure due to the test is not a test failure. However, the ladder shall still support

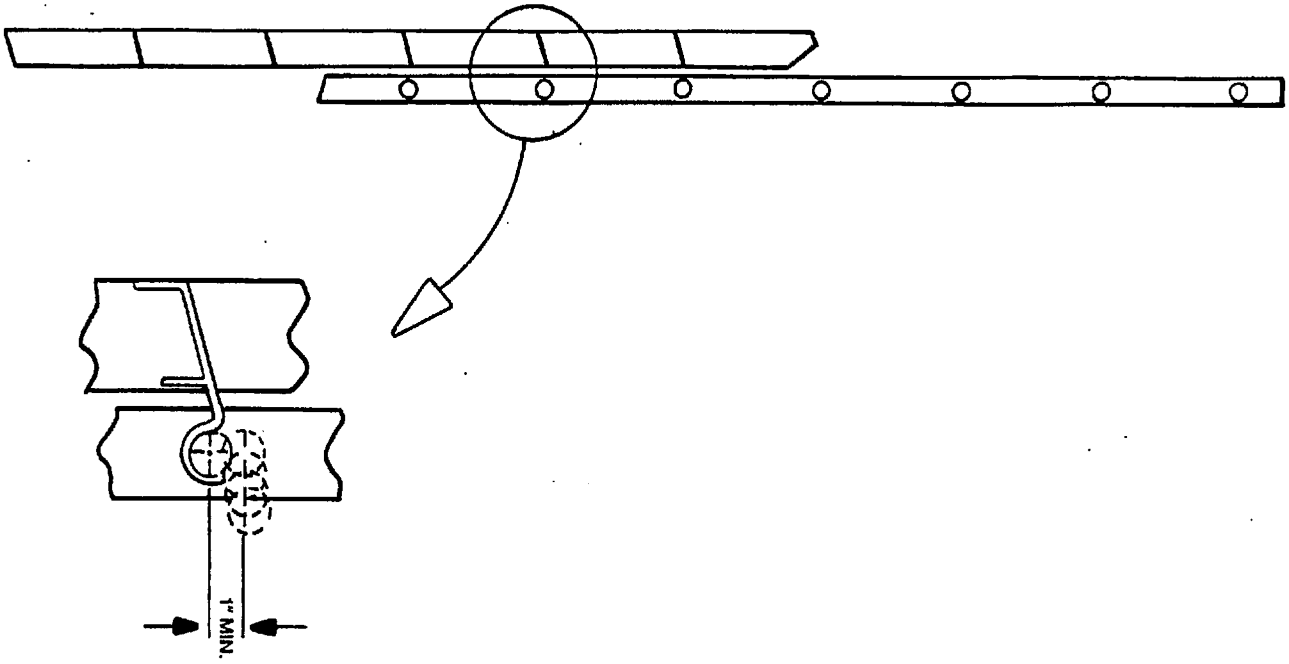


Fig. 7
Lock Test

the test load after the application of the load, even if the rung assumes permanent deformation.

7.3.4.2 Single Lock Load Test

NOTE: This is a design verification test. Not applied to articulated ladders.

The test unit shall either be the shortest full-size ladder manufactured or a unit merely of sufficient length for test purposes. If a full-size ladder is used, the fly section shall be extended one rung beyond the minimum working length of the ladder. Short test units shall consist of portions of the base and fly sections of the extension ladder with all the hardware or fittings attached.

The test units shall be set, as shown in Fig. 5, at a 75-1/2° working angle, with one lock removed. For combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

A downward distributed load, in accordance with Table 10, shall be applied for a minimum period of 1 minute, equally to both side rails on the lowest fly rung above the overlap using two 3-1/2-inch straps, each located next to a rail and centrally loaded through an equalizer bar over the climbing side of the ladder.

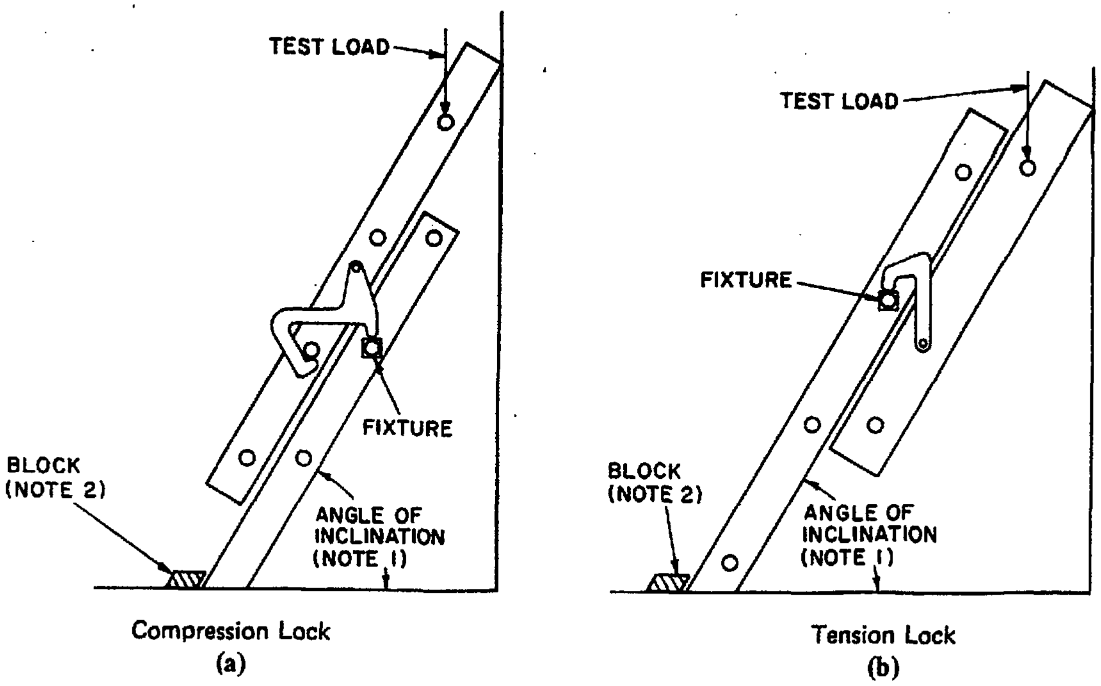
The locks shall withstand this test with no permanent deformation (set) or other visible weakening of the locks. Permanent deformation in other parts of the ladder structure including racking of the ladder structure due to the test is not a test failure. However, the ladder shall still support the test load after the application of the load, even if the rung assumes permanent deformation (set).

7.3.4.3 Lock Tip Load Test

NOTE: This is a design verification test. Not applied to articulated ladders.

The test unit shall be either the shortest full-size ladder manufactured or a unit merely of sufficient length for test purposes. If a full-size ladder is used, the fly section shall be extended a minimum of one rung beyond the minimum working length of the ladder. Short test units shall consist of portions of the base and fly sections of the extension ladder, with the locks attached.

The test unit shall be set at a 75-1/2° working angle, as shown in Fig. 8a and b, with both locks partially engaged. For combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level). The bottom end of the ladder shall be prevented from slipping by a block or equivalent means. The tip of each lock shall bear on the center of a steel test fixture placed over the top of a rung, as shown in Fig. 7a and b. During the test, each lock shall be prevented from pivoting by a means located adjacent to its pivot point, but which shall not in any way affect that portion of the lock under test.



NOTES:

(1) The angle of inclination shall be 75-1/2°, except that for combination ladder in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

(2) A block or equivalent means shall be used to prevent the bottom of the ladder from slipping.

Fig. 8
Lock Tip Load Test

A downward distributed load, in accordance with Table 10, shall be applied for a period of 1 minute, equally to both side rails on the lowest fly rung above the overlap, using two 3-1/2 inch straps, each located next to a rail and centrally loaded through an equalizer bar over the climbing side of the ladder. Permanent deformation in other parts of the ladder structure due to the test is not a test failure. However, the ladder shall still support the test load after the application of the load, even if the rung assumes permanent deformation (set).

7.3.4.4 Cyclic Rung-Lock Design Verification Test

NOTE: This is a design verification test. Not applied to articulated ladders.

A machine equivalent to that pictured in Fig. 9 shall be used to operate the rung lock through the following cycle, as shown in Fig. 10:

(1) One 6-inch upstroke to allow rung lock to engage rung

(2) Full 6-inch downstroke to lock rung lock on rung

(3) Full 12-inch upstroke to disengage rung lock

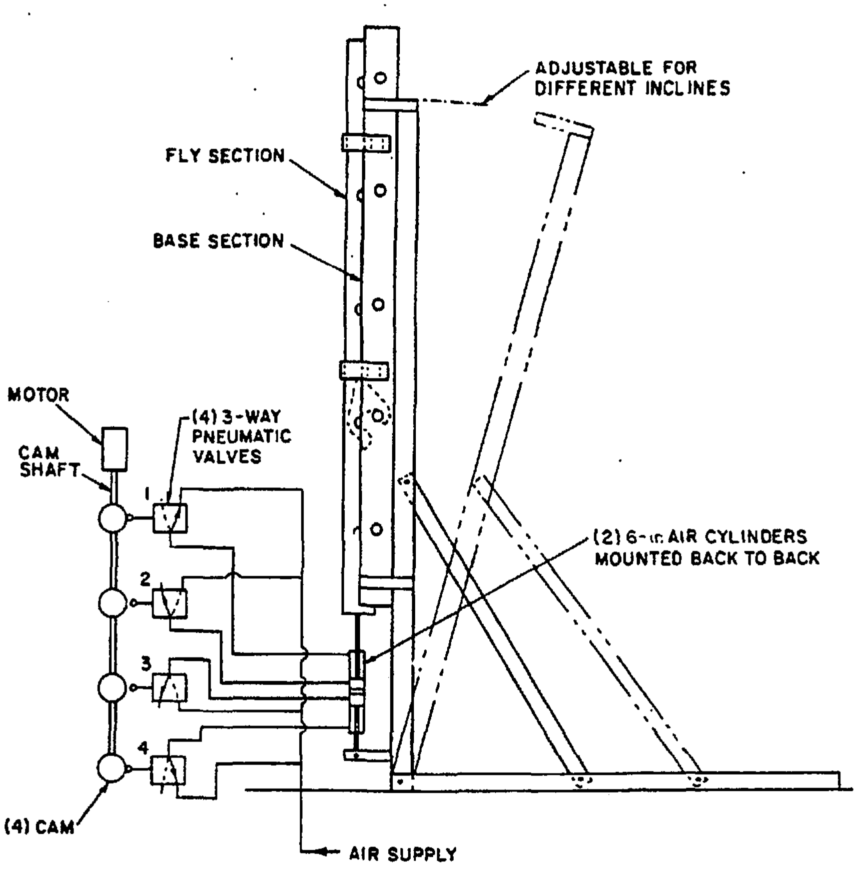
(4) Full 12-inch downstroke to return rung lock to starting position

Locks shall be tested with the ladder at a 75-1/2° angle. For combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level). Spring loaded locks shall be tested with the ladder in the vertical position.

The rung lock may be manually lubricated prior to or during the test. The stroke speed shall be 6 to 12 inches per second. A minimum of 6000 cycles shall be imposed. Any malfunction of the rung lock or fracture of its components, including springs, shall be considered as a failure to meet this requirement. The presence of wear that does not affect the proper functioning of the lock shall not constitute failure.

This test is not intended to apply to fixed-type locks used on extension ladders or combination ladders.

7.3.4.5 Combination Ladder Lock Test. The ladder shall be placed in the horizontal bending test position (See Fig. 1) and the extension section moved forward until it disengages from the lock (See Fig. 7). The distance for such disengagement shall not be less than one inch.


ADJUSTABLE FOR DIFFERENT INCLINES
FLY SECTION
BASE SECTION
MOTOR
CAM SHAFT
(4) 3-WAY PNEUMATIC VALVES
1
2
3
4
(2) 6-in. AIR CYLINDERS MOUNTED BACK TO BACK
(4) CAM
AIR SUPPLY

	Air-Valve Position*			
Operating Cycle	No. 1	No. 2	No. 3	No. 4
Full upstroke	O	C	C	O
Full downstroke	C	O	O	C
One-half downstroke to latch	O	C	O	C
Downstroke to lock	C	O	O	C

*O means open to atmosphere; C means closed to pressure.

Fig. 9
Cyclic Rung Lock Test Arrangement

7.3.5 Extension-Ladder Rung Bending Strength Test

NOTE: This is a design verification test.

The test shall be conducted on either a single section of the ladder or on a three-rung test sample taken from the maximum-width portion of a like ladder section with a like rung. The test unit shall be supported and the load shall be applied as shown in Fig. 11a, using a standard loading block. The rung tested shall be unbraced.

A downward distributed load, in accordance with Table 11, shall be applied on the standard loading block for a period of 1 minute. Upon removal of the test load, the permanent deformation (set) shall be measured with a straight edge and a rule, as shown in Fig. 11b. The allowable permanent deformation (set) shall not exceed *L*/*K* for rung length (*L*) measured between the inside webs of the attached side rails, in accordance with Table 11 (*K* is a factor that varies with duty rating and type). Other than buckling related to the allowable permanent deformation (set), there shall be no test failure.

7.3.6 Rung-to-Side-Rail Shear Strength Test

NOTE: This is a design verification test.

The test unit shall consist either of a single section of the ladder or a three-rung test section taken from a

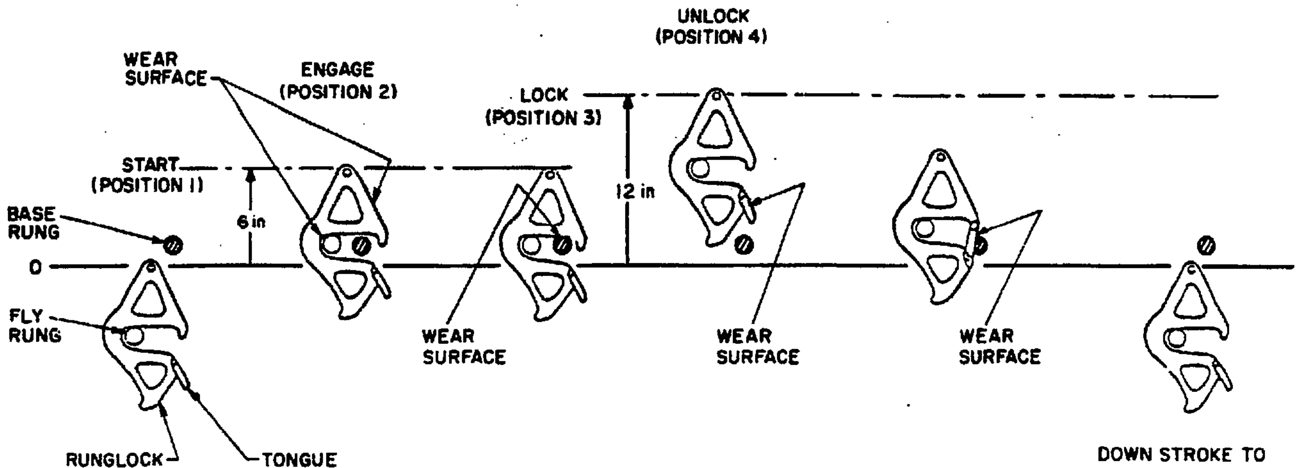
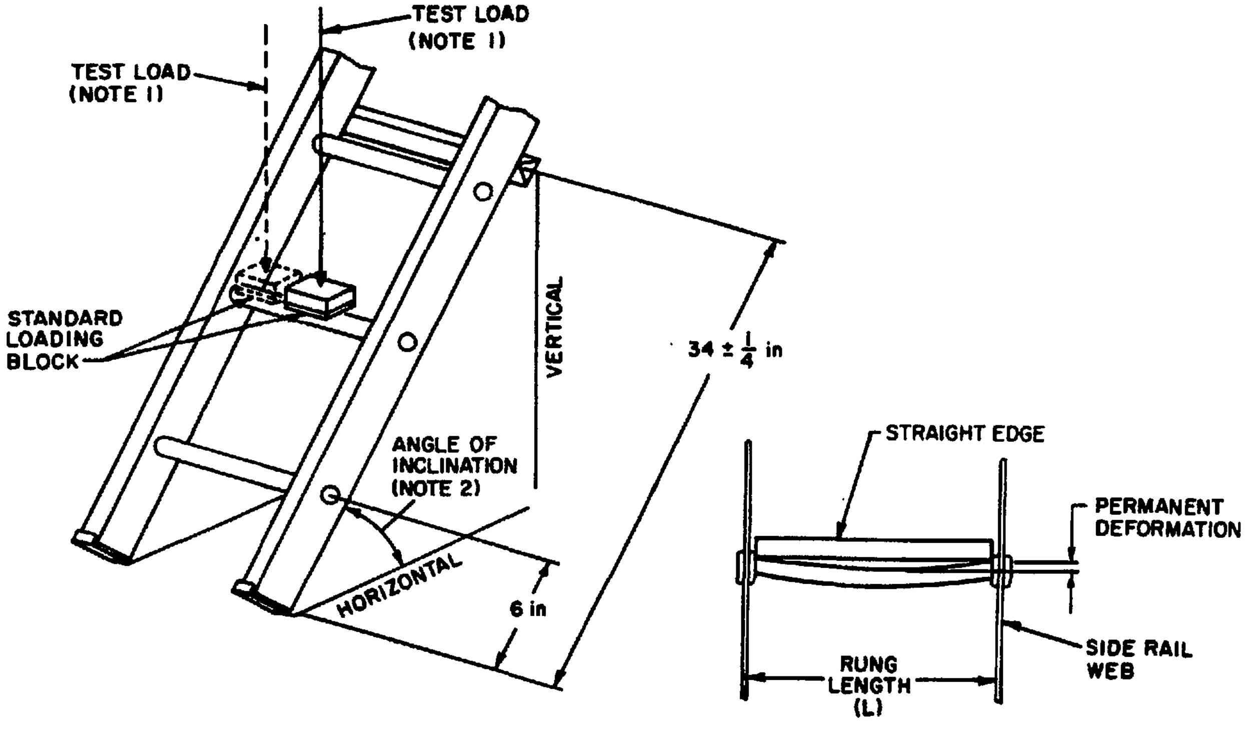


Fig. 10
Rung Lock Testing Cycle



Test Setup
(a)

Reading Permanent Deformation
(b)

NOTES:

(1) The test load for the rung bending test (7.3.5) is indicated by a solid arrow; the test load for the rung-to-side-rail shear strength test (7.3.6) is indicated by the dashed arrow.

(2) The angle of inclination shall be 75-1/2°, except that for combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

Fig. 11
Rung Bending Test and Rung-to-Side-Rail Shear Strength Test

Table 11
Step Bending, Rung Bending, Side-Rail Bending, Compression, and Shear Strength Tests

	Test Load* (pounds)		Maximum Allowable Permanent Deformation (Set)
Duty Rating and Type	Compression, Side-Rail Bending, and Shear Strength Tests	Rung and Step Bending Tests	*L* / *K* † (inches)
Extra heavy duty - Type IA	1200	1000	*L* / 25
Heavy duty - Type I	1000	900	*L* / 50
Medium duty - Type II	900	850	*L* / 75
Light duty - Type III	800	800	*L* / 100

*This test lead is for use in the step bending, rung bending, compression, side-rail bending, and shear strength tests.

†Values listed are for rung bending test only. *L* is the rung length in inches. The factor *K* varies with duty rating and type; K = 25 for extra-heavy-duty ladders, 50 for heavy-duty ladders, 75 for medium-duty ladders, and 100 for light-duty ladders.

Table 12
Rung Torque Tests

	Maximum Test Load	
Duty Rating and Type	Design Verification Torque Test* (inch-pounds)	In-Service Torque Test* (inch-pounds)
Extra heavy duty - Type IA	600	900
Heavy duty - Type I	600	900
Medium duty - Type II	600	900
Light duty - Type III	600	900

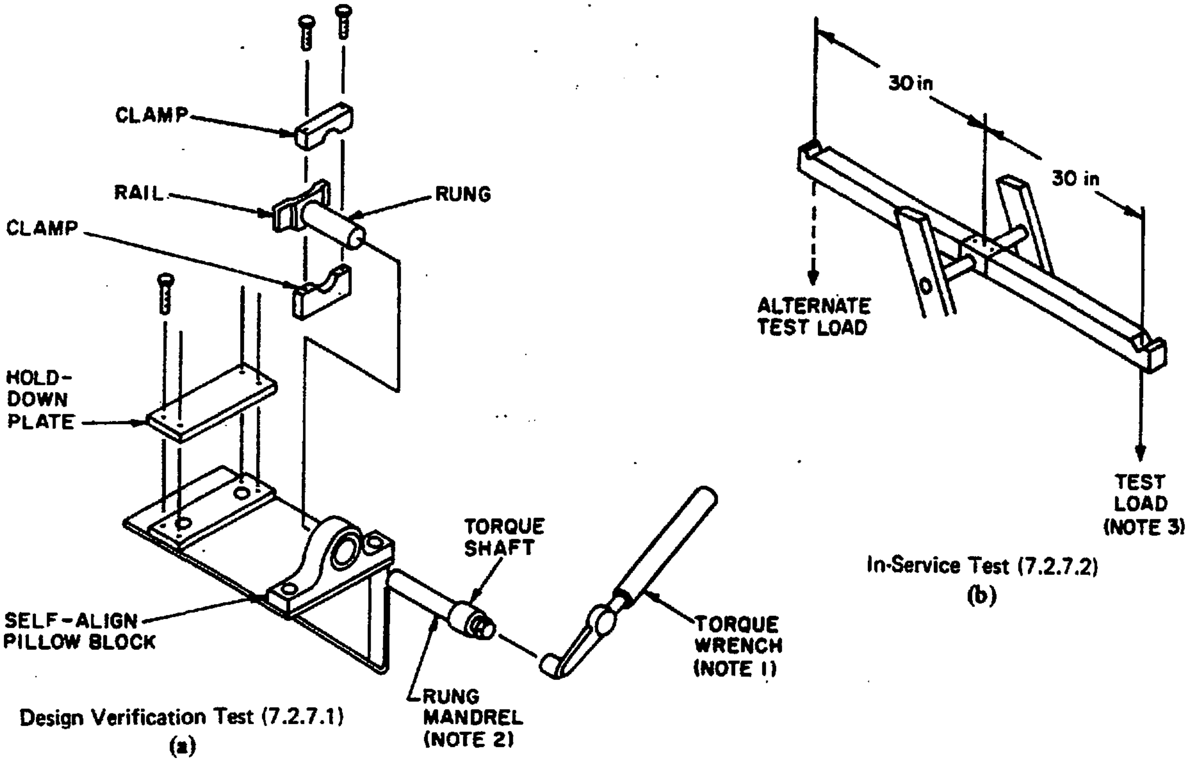
* The test load (pounds) at a 30 inch moment arm is 20 pounds for the design verification torque test and 30 pounds for the in-service torque test. These values will vary with the moment arm selected.

like ladder having the same rung cross section and rung joint. The test unit shall be set at a working angle of 75-1/2° to the horizontal. For combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

A downward distributed load, in accordance with Table 11, shall be applied for a minimum period of 1 minute, as shown in Fig. 11a., but resting on the widest like-cross-section braced and unbraced test rungs as near the side rail as possible. On removing the load, the unit shall show no indication of test failure either in the fastening means attaching the rung or in the side rail.

When a 3-foot test sample is used, the test shall be applied to the center rung. When single sections of a ladder are tested, the test load shall be applied to the third or fourth rung from the bottom.

7.3.7 Rung Torque Tests The test unit shall consist of either a single section of a single, extension, articulated or combination ladder with rungs or a short section comprising at least one rung and two side rails (see Fig. 12). A torque load, in accordance with Table 12, shall be applied in a clockwise and then counter-clockwise direction, alternately, for 10 cycles at each torque test load increment. The rung joing shall be so secured to the side rails that this alternating torque load shall cause no relative motion between the rung



Design Verification Test (7.2.7.1)
(a)

In-Service Test (7.2.7.2)
(b)

NOTES:

(1) An equivalent method may be used to apply torque.

(2) The testing of a hollow rung is illustrated. The rung mandrel is put inside the hollow rung being tested to keep it from collapsing.

(3) The load may be applied by means of a dead weight or a force gage. The moment arm shown may be replaced by a pipe wrench or the equivalent.

(4) Shim the test unit as required, so that the run neutral axis is approximately coincident with the pillow block centerline.

Fig. 12
Rung Torque Test

and the side rails in excess of 9° (based on a 1/16-inch maximum movement for a 1-1/4-inch diameter round rung), for both the design verification test (7.3.7.1) and the in-service test (7.3.7.2).

Torque test loads shall start at 300 inch-pounds and shall increase in 300-inch-pound increments until the maximum load application necessary to meet the requirements of Table 12 is reached.

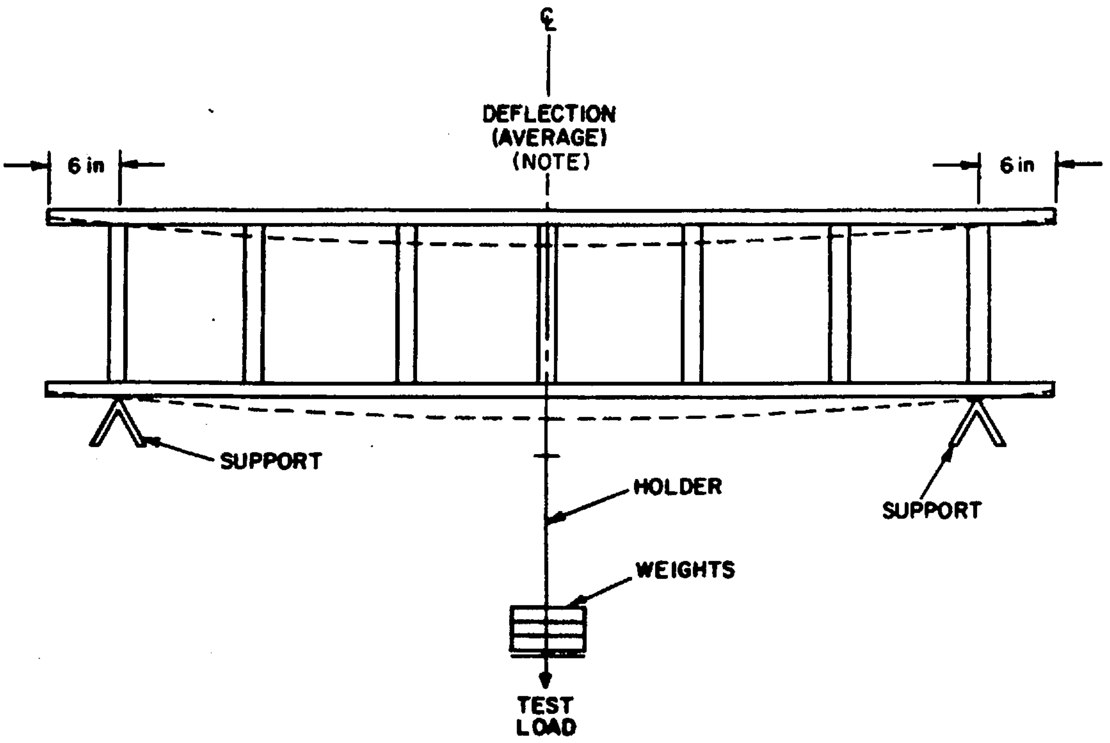
7.3.7.1 Rung Torque Design Verification Test

NOTE: This is a design verification test.

The test unit shall consist of one rung and one side rail and shall be trimmed so that the rung extends 5 to 6 inches from the rung joint (see Fig. 12a). The rail itself shall extend 2 to 2-3/4 inches from each side of the joint. The surface that is visible in the area around the rung joint, consisting of the adjacent area of the rail, the rung joint itself, and the adjacent area of the rung, shall be coated with die bluing or similar material and allowed to dry. A reference line shall be scribed, running along the rung, across the rung joint, and onto the side rail. In the case of tubular rungs, a clamp shall be placed over the rung, and the torque shaft shall be slid through the pillow block into the cut end of the rung until it is within 5/8 inch of the rung joint. The rail shall be clamped in place with the hold-down plate. The rung clamps shall be located 3 inches from the rung joint and shall be tightened in place. All bolts shall be checked for tightness.

When solid rungs are tested, the rung shall be inserted into a chuck, collet, or rung clamp, after which the rail shall be clamped in place with the hold-down plate and the rung chuck, collet, or rung clamp shall be tightened.

The load shall be applied with a torque wrench. The load at which the first movement is noted should be recorded, as well as the type of break (R-J for rung-to-joint movement; J-R for joint-to-rail movement; or R-J-R for rung-to-joint-to-rail movement).



NOTE: The deflection is the difference between the height of the lower edge of the ladder side when unloaded (solid line) and when loaded (dotted line).

Fig. 13
Side Sway Test

7.3.7.2 Rung Torque In-Service Test

NOTE: This is an in-service use test.

The test unit shall consist of either a single section of the ladder or a short section comprising at least one rung and two side rails (see Fig. 12b). The torque load shall be applied to a 3-1/2-inch wide block in the center of the rung, made of such material that the block will not deform the rung locally. The torque shall be applied, as described above, using a test bar whose moment arm may vary as long as the required torque test load in inch-pounds is obtained, but in no case shall the moment arm be less than 18 inches.

Both sets of rung joints and the immediately adjacent areas of the rung and side rail shall be coated with a die marking material, and a line shall be scribed along the rung, across the rung joint, and onto the side rail at both rung joint locations.

The rung shall be so secured to the side rails that the alternating torque load shall cause no relative motion between the rung and the side rails. Both rung joints in the assembly shall meet this requirements. Fig. 11b illustrates typical methods that are acceptable alternates for performing this test.

7.3.8 Side Sway Test

NOTE: This is both a design verification test and an in- service use test.

The test unit shall consist of a single ladder, a section from an extension ladder, a section of an articulated ladder, including a mid-span joint, or both the stepladder portion and the single or extension ladder portion of a combination ladder. This test shall be conducted for all sections of an extension ladder. The sections from a combination ladder shall be individually tested.

Table 13
Maximum Allowable Deflection for Side Sway Test – Midspan Deflection of Lower Side Rail

Test Section Length X* (feet)	Maximum Deflection Y* (inches) Straight and Extension	Maximum Deflection Y* (inches) Combination Ladders
4	0.84	0.84
5	0.88	0.88
6	0.92	0.92
7	0.96	0.96
8	1.00	1.00
9	1.04	1.04
10	1.08	1.08
12	1.16	—
14	1.24	—
16	1.32	—
18	1.40	—
20	1.48	—
22	1.56	—
24	1.64	—
26	1.72	—
28	1.80	—
30	1.88	—

*$Y = 0.04X + 0.68$, where Y = maximum allowable midspan deflection in the side sway test (inches) and X = ladder test section length (feet).

The test section shall be placed on edge, resting on level supports located 6 inches from each end of the ladder, as shown in Fig. 13. The side rail shall be in an approximately horizontal plane, and the rungs shall be in the vertical plane and perpendicular to the ground.

A preload of 30 pounds shall be applied at the center of the span, held for a period of 1 minute, and unloaded. A test load, in accordance with Table 7, shall then be applied for a minimum period of 1 minute to the center of the span over a 3-1/2-inch length of the bottom side rail.

The load shall be applied by hanging weights from the bottom of the lower rail. Care shall be taken to ensure that the load is centered with respect to the width of the rail.

The maximum deflection of the midpoint of the lower side rail, measured to a reference surface, shall not exceed the allowable maximum deflection given in Table 13. Each section shall withstand this test without any permanent deformation (set) in excess of 1/1000 of the effective span of the side rails.

7.3.9 Side-Rail Cantilever Bending Tests

7.3.9.1 Static Side-Rail Cantilever Bending Test

NOTE: This is a design verification test.

The test unit shall consist of either a single ladder section or the base section of an extension ladder, articulated or combination ladder; any safety shoes or spikes affixed to the section shall be removed before the test is conducted. The test unit shall be placed on edge with the rungs in a vertical plane, as shown in Fig. 14a and b. For articulated ladders built with a stabilizer bar across the bottom of the front rail, the test unit shall be placed on edge with the rungs in a vertical plane as shown in Fig. 14c. The lower side rail shall be clamped to a support and shall be unsupported from the bottom end to the midpoint of the lowest rung. If the rung has a flat surface, that surface shall be parallel to the end of the support.

The test load shall be applied by means of a weight, in accordance with Table 14, for a minimum period of 1 minute, to the extreme bottom end of the upper side rail, as shown in Fig. 14a. The load shall be centrally applied to a 2-inch-long block resting on the full width of the rail web and held in place by a clamp. The load attachment point on the clamp shall not be more than 2 inches below the underside of the web of the rail being tested. The weight shall be suspended so that it is acting through the vertical neutral axis of the side rail. The allowable permanent deformation (set) of the upper side rail shall not exceed 1/4 inch.

The test load shall then be applied to the extreme bottom end of the lower side rail in a like manner, as shown in Fig. 14b. Articulated ladders with a stabilizer bar shall have their test load applied to the extreme bottom end of the lower stabilizer bar as shown in Fig. 14c. The allowable permanent deformation (set) of the lower side rail shall not exceed 1/4 inch.

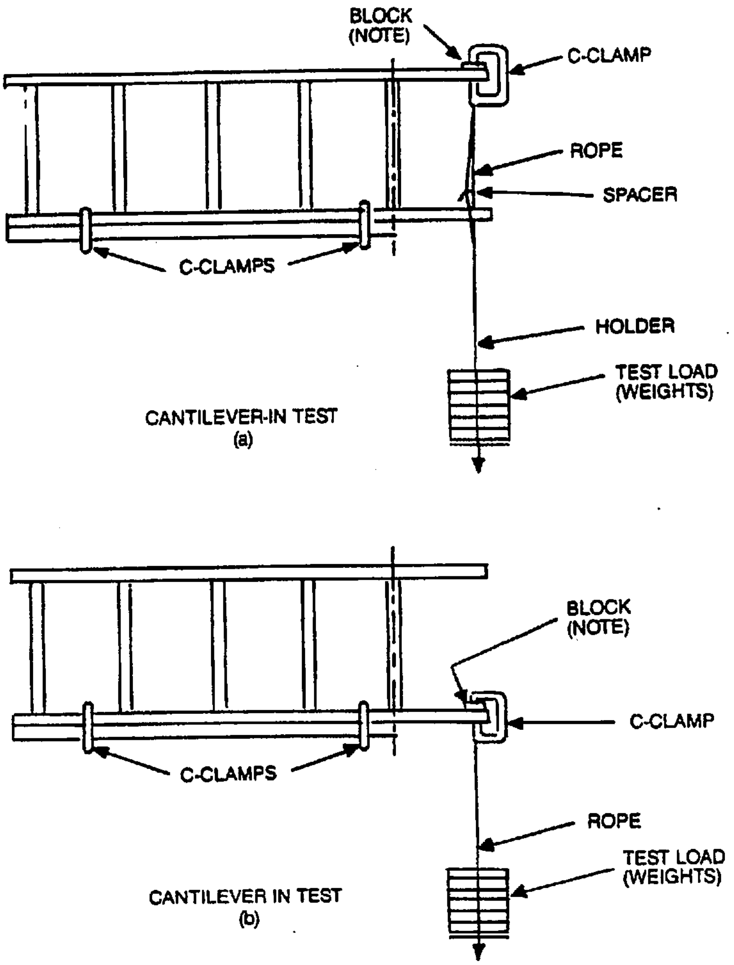
Provided the ladder continues to support the test load, permanent deformation (set) or ultimate failure of any ladder components as a result of the tests, except for the limitation on the maximum allowable permanent deformation (set) of the upper and lower side rails, shall not constitute test failure.

7.3.9.2 Side-Rail Cantilever Dynamic Drop Test

NOTE: This is a design verification test.

The test unit shall be the longest ladder for each base-section rail size. An extension ladder shall be opened 1 foot for the drop test. Ladder feet shall remain on the section, but each foot shall be taped so that the bottom surface makes an angle of 90° with the rail length.

The test ladder shall be placed in a horizontal position with the rungs vertical. The fly section shall be supported 6 inches from the very top of the fly section (including caps), so that the lower rail of the



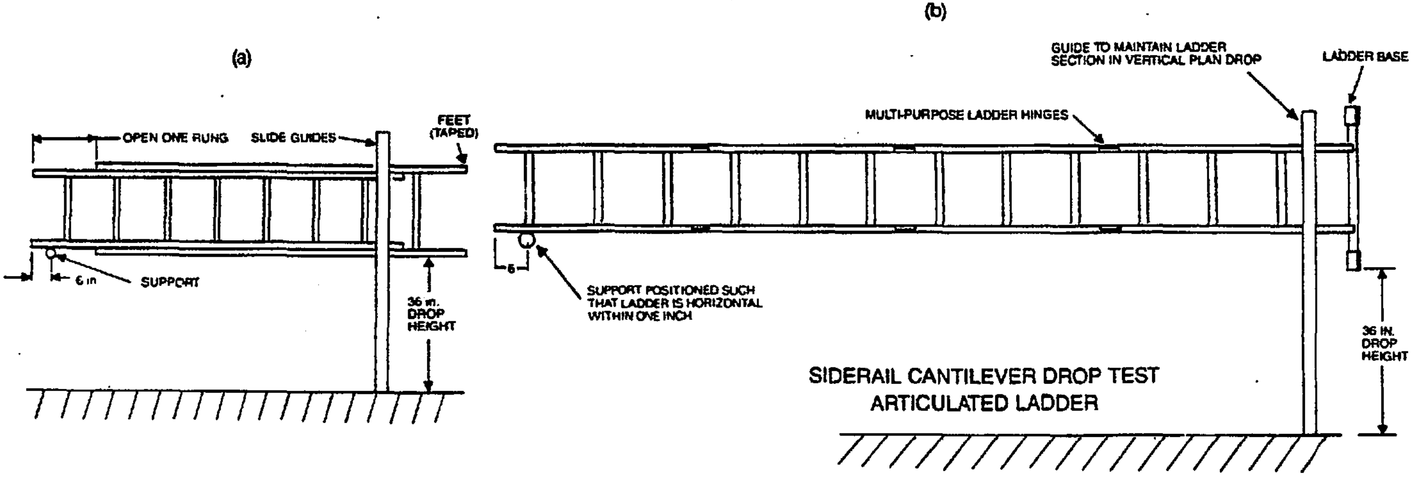
NOTE: The block shall be 1-inch thick, 2-inches long measured along the rail, and of width equal to the clear distance between flanges.

Fig. 14
Static Side-Rail Cantilever Bending Test

Table 14
Static Side-Rail Cantilever Bending Test Load

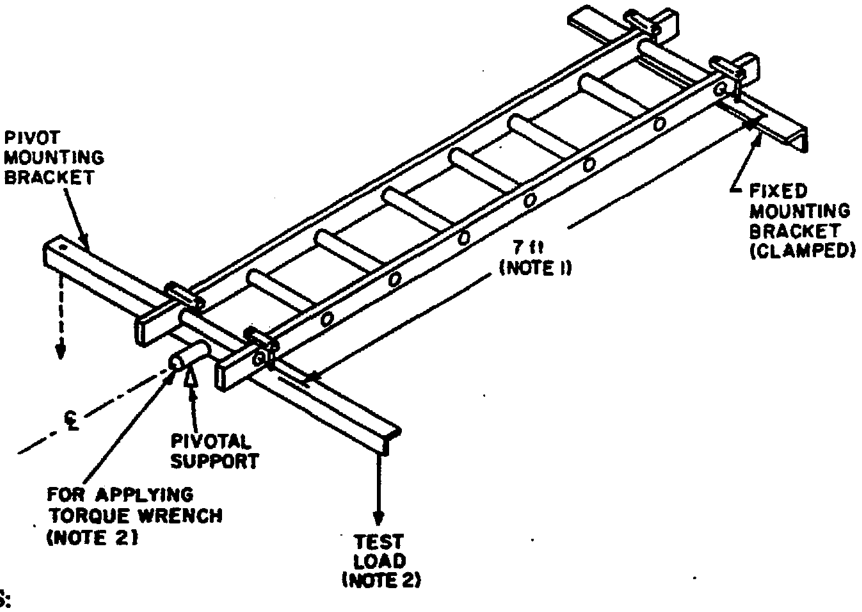
Single Ladder Section or Base Section of Extension Articulated or Combination Ladder			Articulated Ladder with Stabilizer Bar*
Duty Rating and Type	Working Load (pounds)	Test Loads (pounds)	Test Loads (pounds)
Extra heavy duty - Type IA	300	500	1000
Heavy duty - Type I	250	400	800
Medium duty - Type II	225	300	600
Light duty - Type III	200	200	400

*Stabilizer bar which joins both rails.


(a)
OPEN ONE RUNG
SLIDE GUIDES
FEET (TAPED)
6 in
SUPPORT
36 in. DROP HEIGHT
(b)
GUIDE TO MAINTAIN LADDER SECTION IN VERTICAL PLAN DROP
LADDER BASE
MULTI-PURPOSE LADDER HINGES
6
SUPPORT POSITIONED SUCH THAT LADDER IS HORIZONTAL WITHIN ONE INCH
SIDERAIL CANTILEVER DROP TEST
ARTICULATED LADDER
36 IN. DROP HEIGHT

NOTES: This test evaluates the result of inward-cantilever dynamic loading of the ladder.

Fig. 15
Side-Rail Cantilever Dynamic Drop Test



NOTES:

(1) The test span is 7 feet, but any ladder base section, or single ladder, that is at least 8 feet in length may be tested.

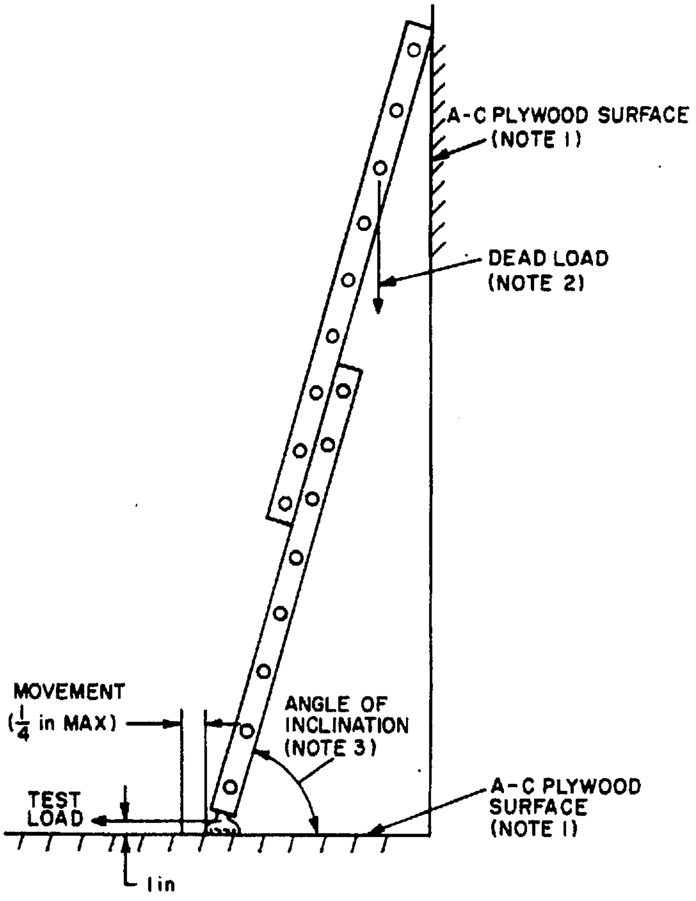
(2) The torque may be applied alternately using a torque wrench, or a test load may be applied alternately on each end of the arm.

Fig. 16
Ladder Twist Test (Single, Extension, or Articulated Ladders)

Table 15
Ladder Section Twist Test

Duty Rating and Type	Working Load (pounds)	Maximum Allowable Angle of Twist θ* (degrees)
Extra heavy duty - Type IA	300	14
Heavy duty - Type I	250	18
Medium duty - Type II	225	20
Light duty - Type III	200	22

*$\theta = 38 - 0.08X$, where θ = maximum allowable angle of twist (degrees) and X = working load (pounds).


A-C PLYWOOD SURFACE (NOTE 1)
DEAD LOAD (NOTE 2)
MOVEMENT ($\frac{1}{4}$ in MAX)
ANGLE OF INCLINATION (NOTE 3)
TEST LOAD
A-C PLYWOOD SURFACE (NOTE 1)
1 in

NOTES:

(1) The grain of the plywood shall be parallel to the direction of loading; the grain on the vertical sheet under the upper end of the fly section shall run in a vertical direction, and the grain on the horizontal sheet under the base section shall be parallel to the direction of the test load.

(2) The dead load shall be applied on the third highest rung.

(3) The angle of inclination shall be 75-1/2°, except that for combination ladders in the extension-ladder orientation a slightly modified angle shall be used so that the tread portions of the steps are horizontal (level).

Fig. 17
Foot Slip Test

Table 16
Foot Slip Test

Duty Rating and Type	Test Load* (pounds)	Horizontal Pulling Force (pounds)
Extra heavy duty - Type IA	300	14
Heavy duty - Type I	250	18
Medium duty - Type II	225	20
Light duty - Type III	200	22

*This load is applied on the third highest fly rung.

base section is 36 inches from a concrete floor. (See Fig. 15a). When testing an articulated ladder with a stabilizing bar across the bottom of the front rail, see Fig. 15b for setup.

To perform the drop test, both rails of the base section shall be guided in a vertical plane during a free-fall drop. The allowable permanent deformation (set) of the lower side rail shall not exceed 1/4 inch.

7.3.10 Ladder Section Twist Test

NOTE: This is a design verification test.

The test unit shall consist of a ladder base section of any length, supported over a 7-foot test span. The ladder shall be placed in a flat horizontal position and supported at each end, as shown in Fig. 16. The horizontal support for the ladder on one end shall be fixed. An initial preload of 600 inch-pounds, applied in a clockwise direction, shall be used to establish a reference for angular deflection, after which the ladder shall be unloaded. A torque of 1200 inch-pounds shall then be applied, using one of the two methods shown in Fig. 16. The torque shall be applied first in a clockwise and then in a counterclockwise direction. The angle of twist measured from the horizontal position shall not be greater than the values given in Table 15. Attention shall be given to ensure that the ladder is tightly clamped onto the test fixtures during this test.

When testing an articulated ladder, this test shall be repeated with a joint at mid-span. If more than one joint design is used, each shall be tested. No permanent deformation to any component which would interefere with the smooth operation of the joint is permissible.

7.3.11 Foot Slip Test

NOTE: This is a design verification test.

Single, extension, combination and articulated ladders shall be tested for skid resistance as shown in Fig. 17. The test unit shall be a 16-foot extension ladder in the fully extended position. The test surface shall be A-C plywood, which shall be presanded using 320 fine wet/dry sandpaper. The "A" side of the plywood shall be placed in contact with the bottom of the ladder. The surface that the top of the fly section rests against shall also be A-C plywood, similarly treated.

A weight, in accordance with Table 16, shall be attached to the third highest fly rung. A horizontal pulling force, in accordance with Table 16, statically applied to the bottom of the ladder at 1 inch above the test surface, shall not cause movement in excess of 1/4 inch across the test surface.

7.3.12 Multisection Extending Force Test

NOTE: This is a design verification test.

The test unit shall be a complete extension ladder or an articulated ladder with an extendible section where no hinge is employed. The unit shall be set in a vertical position, at the minimum working length of the ladder. The base section may be braced or otherwise held to maintain vertical alignment.

A measured downward force shall be applied to the rope if the ladder has a rope and pulley system installed. The force shall be smoothly applied to cause vertical extension of the fly section of 2 feet or more, at a rate of 1/2 to 1 foot per second. For those ladders not equipped with a rope and pulley, the measured force shall be applied vertically to the bottom rung of the fly section.

The maximum measured force that occurs during each pull shall be recorded. Three test pulls shall be done for each ladder, and the maximum forces shall be averaged for the three pulls. This average maximum shall not exceed two times the weight of the ladder fly section.

7.4 Articulated Ladder Tests

NOTE: These are design verification tests.

Articulated ladders shall comply with the test requirements for stepladders when in the stepladder mode, for trestle ladders when in the trestle ladder mode for straight ladders when in the straight ladder mode, and with the test requirements 7.4.1 when in the scaffold or worktable position. In addition, it should comply with the additional joint tests 7.4.2. through 7.4.4. If the ladder design includes extendible sections all tests shall be conducted with those sections fully extended. The test shall be conducted with the ladder on a test surface of A-C plywood which shall be presanded using 320 fine wet/dry sandpaper. The "A" side of the plywood shall be placed in contact with the feet of the ladder.

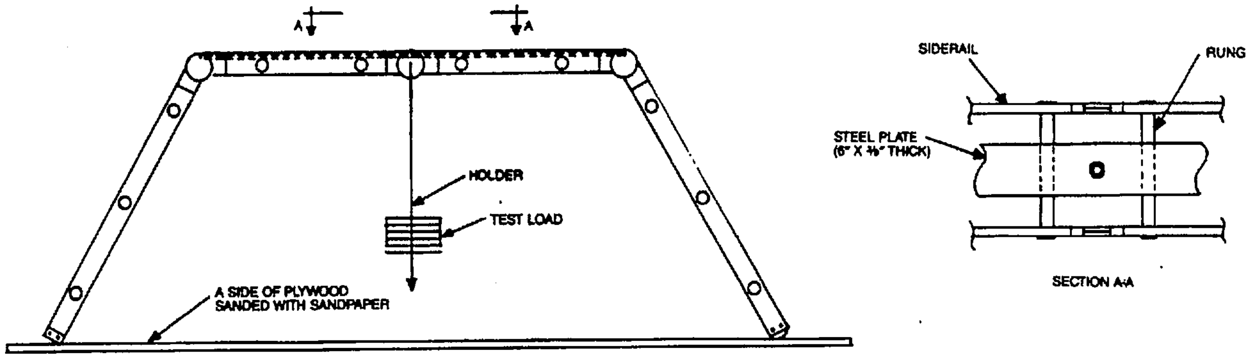

A
A
HOLDER
TEST LOAD
A SIDE OF PLYWOOD SANDED WITH SANDPAPER
SIDERAIL
RUNG
STEEL PLATE (6" X 3/8" THICK)
SECTION A-A

Fig. 18
Scaffold Bending Strength Test

Table 17
Articulated Ladder
Self-Supported Scaffold Test

Duty Rating and Type	Working Load (pounds)	Test Load (pounds)
Extra heavy duty - Type IA	300	1200
Heavy duty - Type I	250	1000
Medium duty - Type II	225	900
Light duty - Type III	200	800

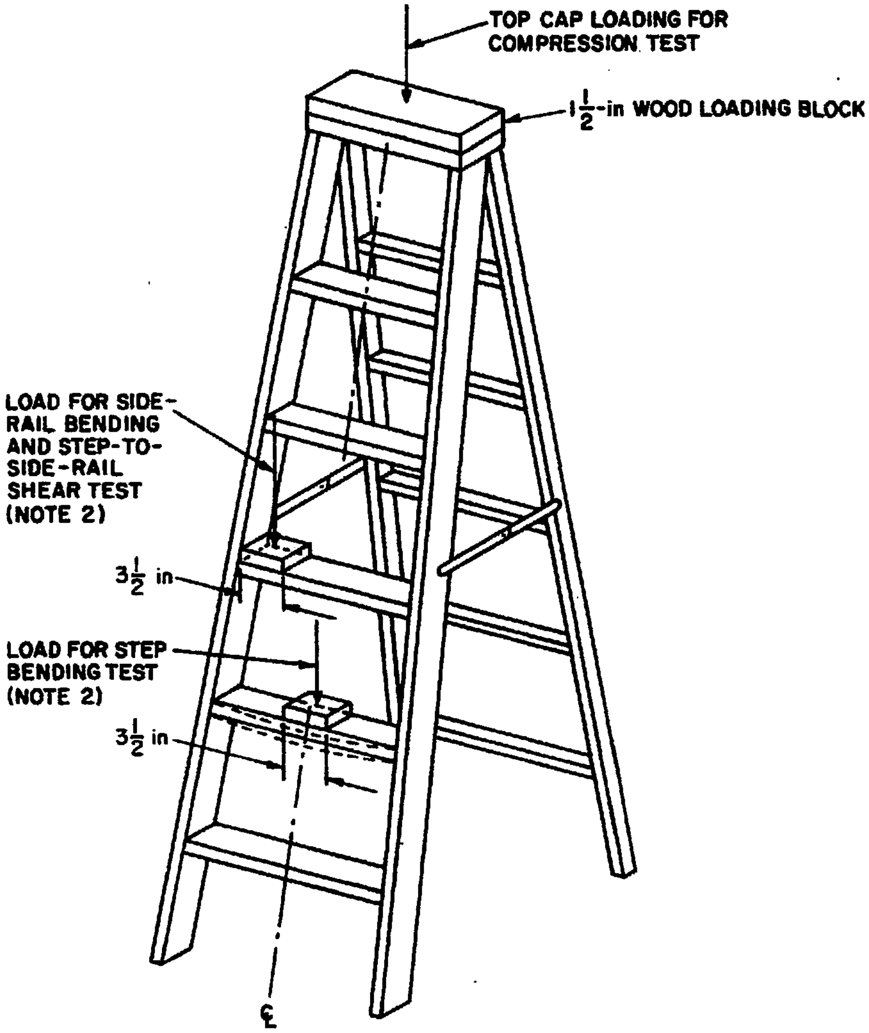
7.4.1 Scaffold Bending Strength Test. When set up as a scaffold, the ladder shall be capable of withstanding, without test failure, four times the duty rating. The load is to be applied to the center or simulated decking or plank — a steel plate 6" wide and 3/8" thick, extending the length of the scaffold top, as shown in Fig. 18. The feet of the ladder shall rest on the "A" side of AC plywood, which shall be presanded with 320 fine wet/dry sandpaper. (See Table 17)

7.4.2 Cyclic Joint Test. After initial lubrication, a pair of joints shall be cycled from the closed position to fully open, for 6,000 cycles. The hinge is to be locked and unlocked in each of its locking positions during every cycle. The use of additional lubricant on the joints during the test is not permissible. Following this test, the ladder shall meet the requirements of the Horizontal Bending Test, Inclined Load, and Unlocked Joint Test.

7.4.3 Unlocked Joint Test. The test ladder should be full length with a pair of unlocked and dry (no lubricant other than that used during manufacture) joints at midspan. In the straight ladder mode the internal friction in the joint shall not allow the ladder to rest at an angle of 75-1/2° upon application of a 5 pound vertical load over a 3-1/2 inch wide area at the center of the lowest rung.

7.4.4 Single Joint Lock Test. The test unit shall be a full-size ladder set in the single or extension ladder mode, at a 75-1/2° working angle, with one hinge at midspan unlocked.

A downward distributed load, in accordance with Table 10, shall be applied for a period of one minute equally to both side rails on the lowest rung above the


TOP CAP LOADING FOR COMPRESSION TEST
1 1/2-in WOOD LOADING BLOCK
LOAD FOR SIDE-RAIL BENDING AND STEP-TO-SIDE-RAIL SHEAR TEST (NOTE 2)
3 1/2 in
LOAD FOR STEP BENDING TEST (NOTE 2)
3 1/2 in
℄

NOTES:
(1) This test setup is illustrated for a stepladder.
(2) Typical locations for the test loads are shown; see 7.3.2 and 7.3.4 as to the placement of the loads.

Fig. 19
Compression, Step Bending, Side-Rail Bending, and Step-to-Side-Rail Shear Tests

unlocked hinge. The load shall be applied using two 3-1/2 inch straps, each located next to a rail and centrally loaded through an equalizer bar over the climbing side of the ladder.

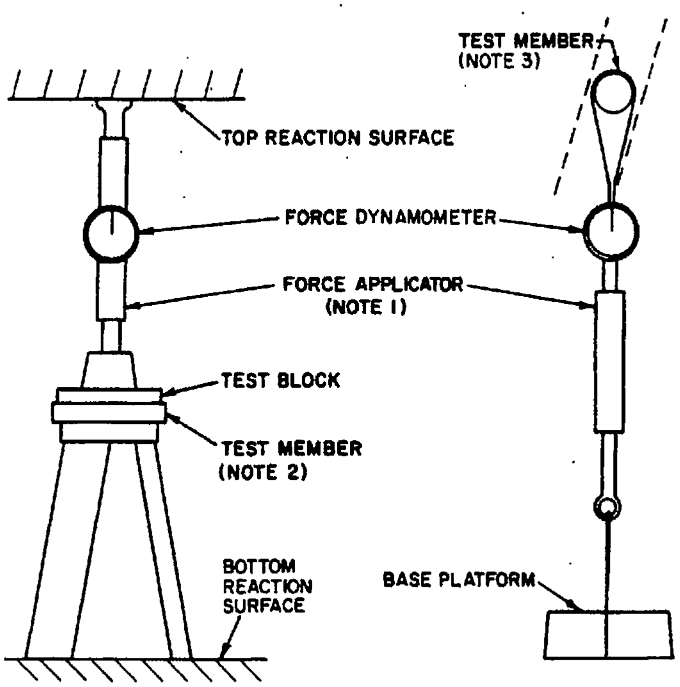
The ladder shall withstand this test without ultimate failure or visible weakening of the hinges, and the joint shall still be functional.

7.5 Step, Trestle, Extension Trestle, Platform, Combination, Articulated Ladder and Step Stool Tests

7.5.1 Compression Test

NOTE: This is a design verification test.

A load test of the entire ladder or step stool shall be made with the ladder or stool in an open position, as shown in Fig. 19 and 20. A uniformly distributed load, in accordance with Table 11, shall be applied for a minimum period of 1 minute to the ladder top cap or platform. A combination ladder shall be tested in its stepladder position, with the test load applied uniformly to the top cap, or to the top step when no top cap is used. Trestle ladders, articulated ladders which permit their use as a double front stepladder and the base section of extension trestle ladders shall be subjected to twice the test loads in Table 11, by applying the test load simultaneously to both sections of the ladder, at



Top-Loading Method
(a)

Bottom-Loading Method
(b)

NOTES:

(1) Hydraulic, pneumatic, or mechanical means may be used to apply the load.

(2) The top loading method is illustrated for the compression test, where it is applied to the top of the ladder, but it can also be used for the other tests.

(3) The bottom loading method is illustrated for the rung bending test, but it can also be used for the other tests.

Fig. 20
Methods (Other Than Dead Weight) for Applying Test Loads

the top cap of each section, or to the top step when no top cap is used. The unit shall withstand the load without test failure.

7.5.2. Side-Rail Bending Test

NOTE: This is a design verification test.

The resistance to side-rail bending shall be tested by placing a load, in accordance with Table 11, over a 3-1/2-inch width on the middle step adjacent to one side rail of the ladder for a minimum period of 1minute, with the ladder in an open position, as shown in Fig. 19 and 20. The next higher step shall also be tested. A combination ladder shall be tested while erected in its stepladder position. The ladder shall withstand the load without test failure.

7.5.3 Step or Platform Bending Test

NOTE: This is a design verification test.

The strength of the step, rung, or platform section shall be tested by applying a load, in accordance with Table 11, for a minimum period of 1 minute, over a 3-1/2 inch length across the full width of the step, rung, or platform and on the center of the longest or bottom step or rung, with the ladder in the open position, as shown in Fig. 19 and 20. The test load shall also be applied to the longest like step without braces, as well as to steps, rungs, or platforms of different designs or material specifications. The test load shall also be applied to the top cap of a step stool. The step, rung, platform, or step stool top shall withstand the load without test failure or permanent deformation (set) in excess of 1/100 of the clear length of the step, rung, or platform between side rails (between inside flanges) or of the overall length of the stool top cap.

7.5.4 Step-to-Side-Rail Shear Strength Test

NOTE: This is a design verification test.

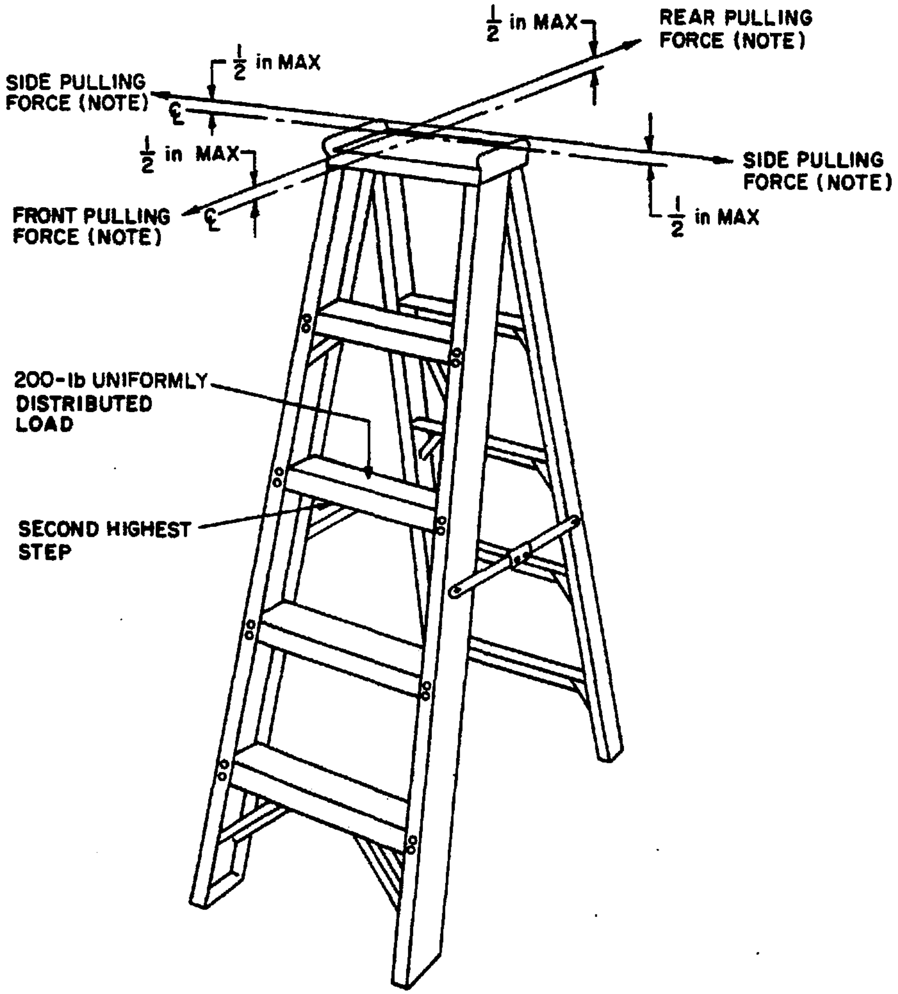
The shear strength of the step- or rung-to-side-rail joint shall be measured by applying a test load, in accordance with Table 11, for a minimum period of 1 minute, over a 3-1/2 inch width of the step or rung. The test load shall be applied on the longest braced

Table 18
Stability Test Loads*

Duty Rating and Type	Distributed Load †	Front Pulling Force	Side Pulling Force	Rear Pulling Force: Type-III Platform Ladders	Rear Pulling Force: Other Ladders and Step Stools	Torsional Stability Pulling Force
Extra heavy duty - Type IA	200	25	20	35	45	30
Heavy duty - Type I	200	25	20	35	45	30
Medium duty - Type II	200	25	20	35	45	25
Light duty - Type III	200	25	20	35	45	20

*All quantities are in pounds.

†This load is applied at the second highest step, ladder top cap, top step, or platform.


1/2 in MAX
REAR PULLING FORCE (NOTE)
1/2 in MAX
SIDE PULLING FORCE (NOTE)
℄
1/2 in MAX
SIDE PULLING FORCE (NOTE)
1/2 in MAX
FRONT PULLING FORCE (NOTE)
℄
200-lb UNIFORMLY DISTRIBUTED LOAD
SECOND HIGHEST STEP

NOTES:

(1) The pulling force shall be applied at a maximum distance of 1/2 inch above the top of the stepladder.

(2) This test is illustrated for a stepladder.

Fig. 21
Front, Side, and Rear Stability Tests

and unbraced steps or rungs with the least fastening. The same test load shall be applied to steps or rungs of different cross-sectional designs or materials. The test load shall be applied as near the side rail as possible, with the ladder in an open position, as shown in Fig. 19 and 20. The test load shall also be applied to the top cap of a step stool, over a 3-1/2-inch wide area across the frontt-to-back depth of the top cap adjacent to one side rail. When the load is removed, the unit shall show no indication of test failure in the fastening means attaching the step or rung to the side rail or test failure of any other component.

7.5.5 Bucket (Pail) Shelf Test

NOTE: This is a design verification test.

The bucket shelf shall be constructed so that it supports a distributed load of 100 pounds, applied to the shelf for a minimum period of 1 minute, with the ladder in an open position with the spreaders locked. The bucket shelf shall withstand the load without ultimate failure.

7.5.6 Front Stability Test

NOTE: This is a design verification test.

The ladder shall be set in the open position on a level floor; a combination ladder shall be opened to its stepladder position. A uniformly distributed load, in accordance with Table 18, comprising lead weights or the equivalent to maximize the density of the loading medium, shall be applied to the second highest step, rung, or the platform (the highest proper standing level), as shown in Fig. 21. (For an extension trestle ladder, the load shall be applied to the second highest extension-section rung.)

The ladder shall then be subjected to a horizontal pulling force, in accordance with Table 18, applied at the geometric center of the stepladder top cap, at a distance of not more than 1/2 inch above its top surface, towards the front of the ladder, as shown in Fig. 21. The pulling force shall be applied to the top horizontal guard rail member of platform ladders, to the apex of the base section of trestle and extension trestle ladders, and to the top cap of combination ladders or to the top step when no top cap is used. Step stools shall be loaded with the distributed load on the top cap, and the pulling force shall be applied to the top cap also. The test surface shall be such as to ensure that the ladder does not slip or slide during the test.

During this test, the minimum load that causes the ladder to tip over shall not be less than the value shown in Table 18. Ladders equipped with a bucket shelf shall be tested with the bucket shelf in the in-use position.

7.5.7. Side Stability Test

NOTE: This is a design verification test.

The side stability of a ladder shall be measured with the ladder set in an open position on a level floor. A uniformly distributed load, in accordance with Table 18, comprising lead weights or the equivalent to maximize the density of the loading medium, shall be applied to the second highest step, rung, or the platform, as shown in Fig. 21. (For an extension trestle ladder the load shall be applied to the second highest extension-section rung.)

The ladder shall then be subjected to a horizontal pulling force, in accordance with Table 18, applied to the side of the front rail, at the geometric center of the stepladder top cap, at a distance of not more than 1/2 inch above its top surface, as shown in Fig. 21. The pulling force shall be applied to the top horizontal guard rail member of platform ladders, to the apex of the base section of trestle and extension trestle ladders, and to the top cap of combination ladders or to the top step when no top cap is used. Step stools shall be loaded with the distributed load on the top cap, and the pulling force shall be applied to the top cap also. The test surface shall be such as to ensure that the ladder does not slip or slide during the test.

During this test, the minimum load that causes the ladder to tip over shall not be less than the value shown in Table 18. The test shall be run with the force applied to both sides, and the values shall be averaged to obtain the minimum load. Ladders equipped with a bucket shelf shall be tested with the bucket shelf in the in-use position.

7.5.8 Rear Stability Test

NOTE: This is a design verification test.

The rear stability of a ladder shall be measured by placing the ladder in an open position on a level floor. A uniformly distributed load, in accordance with Table 18, comprising lead weights or the equivalent to maximize the density of the loading medium, shall be placed on the second highest step, rung, or the platform (the highest proper standing level), as shown in Fig. 21. (For an extension trestle ladder the load shall be applied to the second highest extension-section rung.)

The ladder shall then be subjected to a horizontal pulling force, in accordance with Table 18, applied to the geometric center of the stepladder top cap, at a distance of notmore than 1/2 inch above its top surface, in a rearward direction, as shown in Fig. 21.

Table 19
Maximum Allowable Racking Deflection*

Ladder Size (feet)	Deflection† Type-I and I-A ($Y = 1.35X + 3.9$)	Type-II ($Y = 1.35X + 7.9$)	Type-III ($Y = 1.35X + 7.9$)
3	7.95	11.95	11.95
4	9.30	13.30	13.30
5	10.65	14.65	14.65
6	12.00	16.00	16.00
7	13.35	17.35	–
8	14.70	18.70	–
10	17.40	21.40	–
12	20.10	24.10	–
14	22.80	–	–
16	25.50	–	–
18	28.20	–	–
20	30.90	–	–

*All deflections are measured in inches.
†Y = lateral racking deflection (inches) during a 6 pound pull; X = ladder size (feet).

The pulling force shall be applied to the top horizontal guard rail member of platform ladders, to the apex of the base section of trestle and extension trestle ladders, and to the top cap of combination ladders or the top step when no top cap is used. Step stools shall be loaded with the distributed load on the top cap, and the pulling force shall be applied to the top cap also. The test surface shall be such as to ensure that the ladder does not slip or slide during the test.

During this test, the minimum load that causes the ladder to tip over shall not be less than the value shown in Table 18. Ladders equipped with a bucket shelf shall be tested with the bucket shelf in the in-use position.

7.5.9 Torsional Stability Test

NOTE: This is a design verification test.

The test unit shall be placed on a level floor, in the fully opened position, with the spreaders properly set. A 200-pound distributed dead load, comprising lead weights or the equivalent to maximize the density of the loading medium, shall be applied to the ladder top cap, platform, or top step when no top cap is used, as shown in Fig. 22.

A horizontal force, in accordance with Table 18, directed to the rear of the ladder, shall be applied to the ladder top cap at a distance of 18 inches from the vertical centerline of the ladder, as shown in Fig. 22. For articulated ladders, the horizontal force shall be applied as close as possible to the apex hinge. The force shall be maintained perpendicular to the moment arm at the final load position with a tolerance of ±10°, during the test. The test shall be conducted on a dry, unwaxed, vinyl tile floor (see 7.1.11).

Relative movement in excess of 1 inch of the ladder with respect to the floor, any damage or visible weakening of the ladder structure or component, or any significant visible major damage from permanent deformation (set) of the test unit upon release of the test force shall constitute failure to meet this requirement. Minor permanent deformation (set) of individual ladder components, such as diagonal braces or rear horizontal braces, of less than 1/8 inch shall not constitute test failure.

Ladders equipped with a bucket shelf shall be tested with the bucket shelf in the in-use position. This test is not applicable to step stools, platform ladders less than 3 feet in size, and other step-type ladders less than 5 feet in size.

7.5.10 Racking Test

NOTE: This is a design verification test.

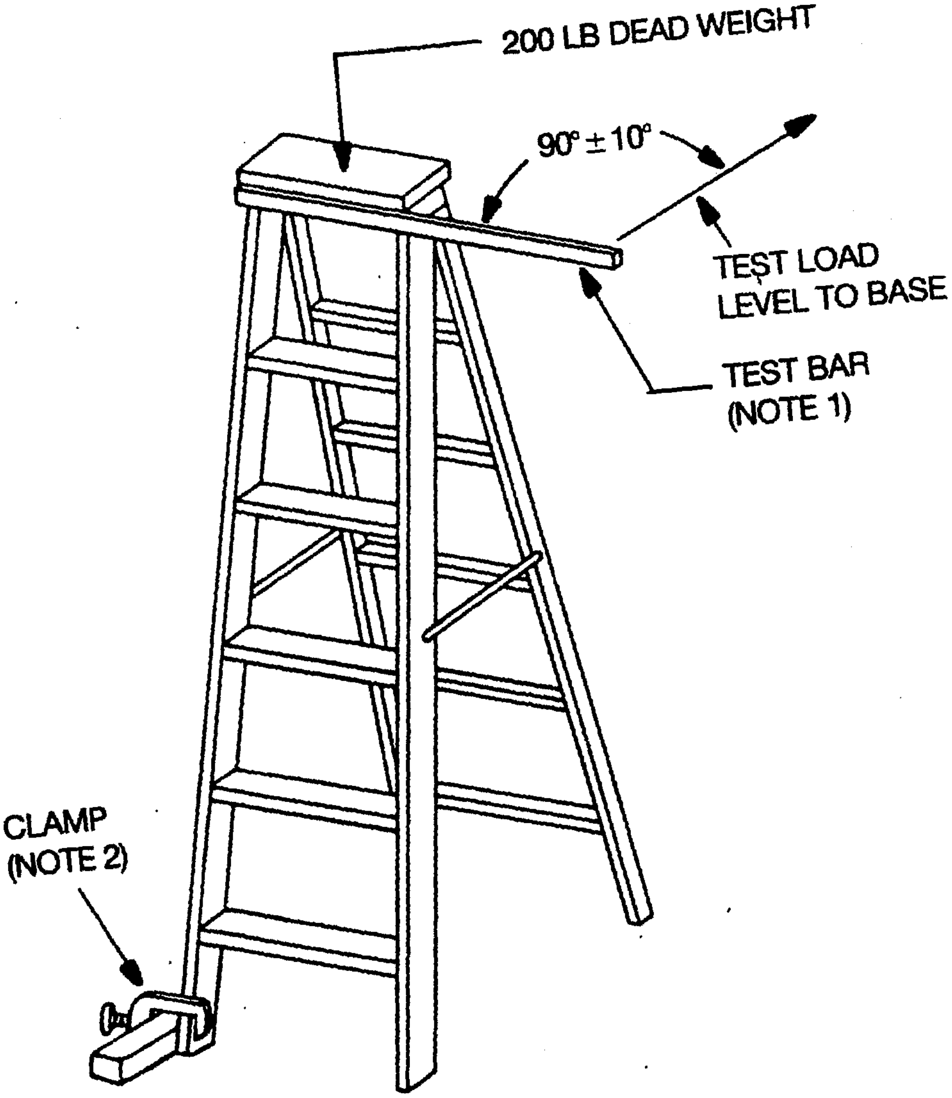
The test unit shall be placed on a level floor, in the fully opened position, with the spreaders properly set. Both front feet shall be individually blocked to prevent movement relative to the floor, as shown in Fig. 23a. A 100-pound distributed dead load shall be applied to the bottom step; no part of the load shall contact either of the two front rails during the test.

A vertical pulling force shall be applied to the rear of the ladder top cap, top guard rail or top step when no top cap is used, so as to lift both rear feet and provide a 3-inch clearance between the rear feet and the floor. A 4-pound pre-load shall then be applied at the bottom of one rear side-rail; after which the ladder shall be unloaded to establish a no-load reference point. A 6-pound lateral pulling force shall be applied at the bottom of one rear rail, using a force gage or the equivalent, as shown in Fig. 23b, and the lateral displacement of that rear rail shall be measured relative to its no-load position. The maximum lateral displacement shall not exceed the value given in Table 19.

Ladders equipped with a bucket shelf shall be tested with the bucket shelf in the in-use position. This test is not applicable to ladder type step stools.

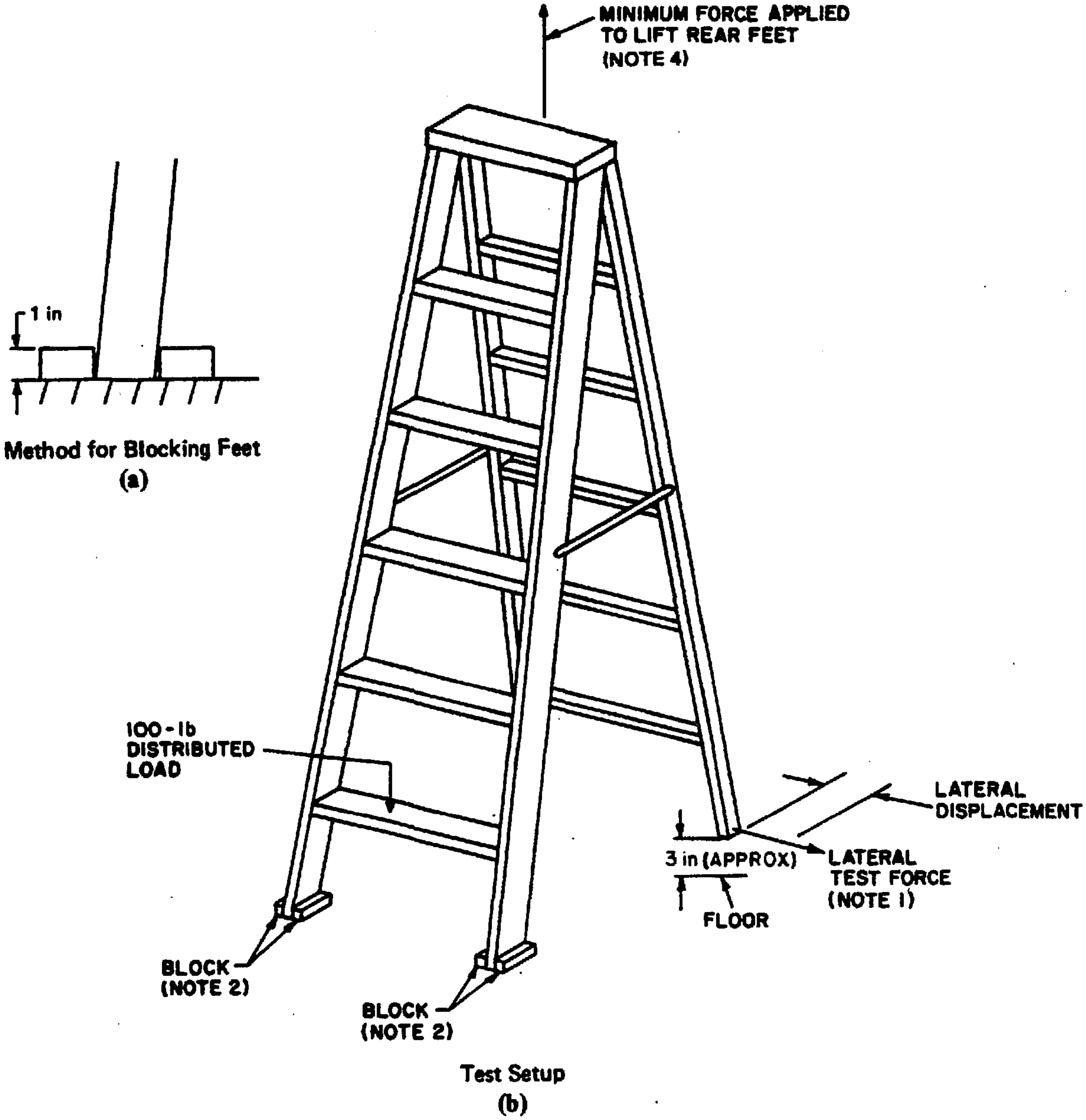
7.5.10.1 Ladders with Plastic Top Caps

A high temperature and a low temperature racking test shall be required for ladders with plastic top caps. The high temperature test shall be performed with the stepladder at 140°F with 50% greater rack allowable than in the room temperature test. The low temperature test shall be performed at a temperature of –20°F with no fracture permitted.



NOTES:
- (1) The test bar is clamped to the top cap.
- (2) The clamp is used only for the Rail Torsion and Spreader tests in 7.5.12.
- (3) The test surface shall be dry, unwaxed vinyl tile.
- (4) This test is illustrated for a stepladder.

Fig. 22
Torsional Stability and Rail Torsion and Spreader Tests



Method for Blocking Feet
(a)

Test Setup
(b)

NOTES:

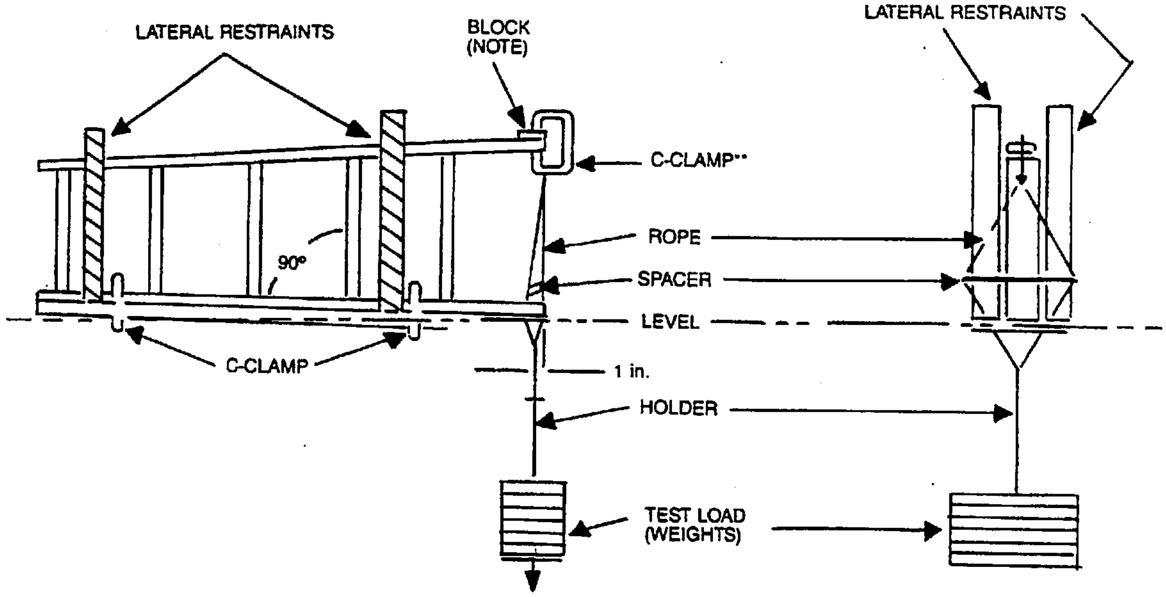
(1) The lateral force shall be applied using a force gage or the equivalent. The force shall be applied parallel to the bottom of the front section. The lateral displacement of the rear section shall be measured parallel to the direction the lateral force is applied.

(2) Blocks fixed to the test surface are used to resist rail rotation.

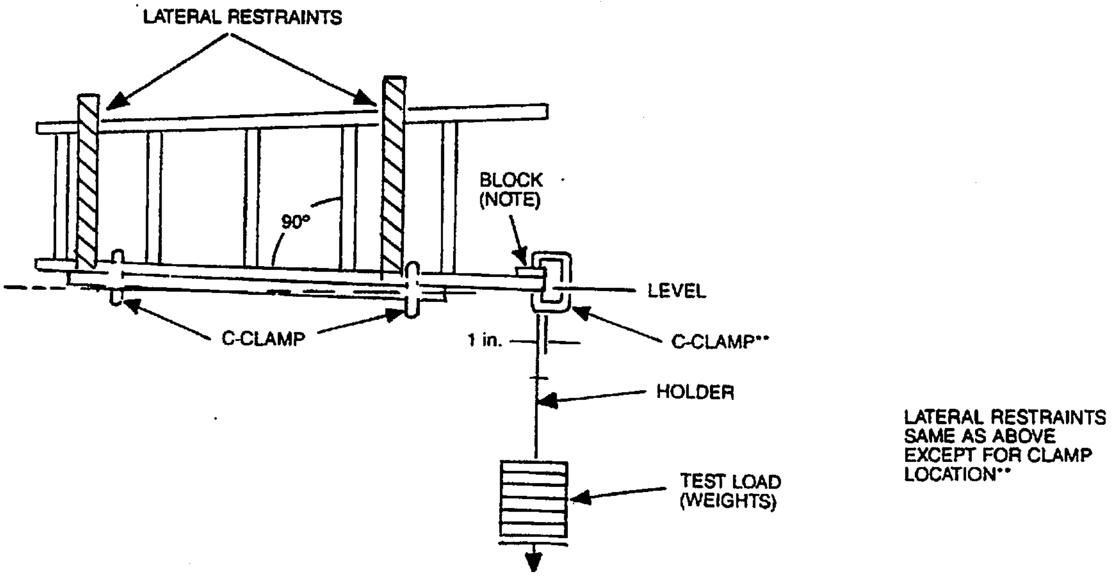
(3) This test is illustrated for a stepladder.

(4) The vertical lifting force shall be applied by a member bearing against the rear center of the ladder top cap, and shall be attached to a 5-16-inch minimum diameter rope at least 3 feet long with the rope secured against motion in any direction at least 3 feet above the ladder top.

Fig. 23
Racking Test



CANTILEVER-IN TEST
(a)



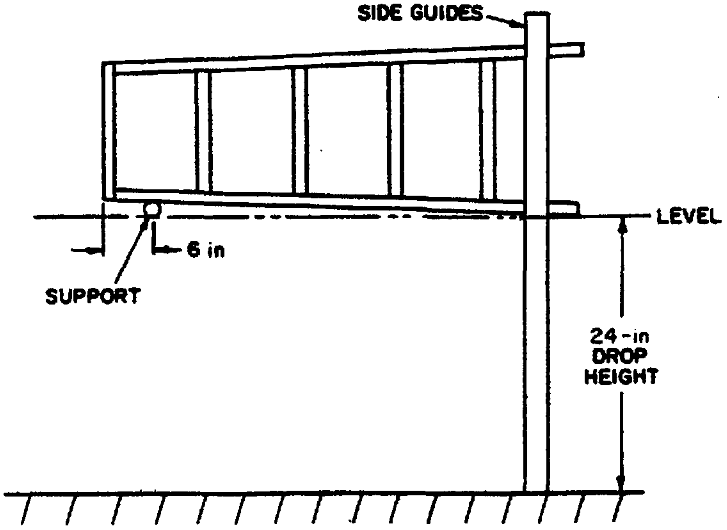
CANTILEVER-OUT TEST
(b)

NOTE: The block shall be 1-inch thick, 2-inches long measured along the rail, and of width equal to the clear distance between flanges.

Fig. 24
Rail Static Cantilever Test

Table 20
Static Cantilever Bending Test

Duty Rating and Type	Working Load	Front Rail Cantilever Test Load (pounds)	Rear Rail Cantilever Test Load (pounds)
Extra heavy duty - Type IA	300	300	200
Heavy duty - Type I	250	250	175
Medium duty - Type II	225	200	150
Light duty - Type III	200	150	125



NOTE: This test is for cantilever in only. It is performed with the ladder closed.

Fig. 25
Dynamic Drop Test

7.5.11 Rail Cantilever Bending Tests

7.5.11.1 Front Rail Static Cantilever Bending Test

NOTE: This is a design verification test.

The front rail cantilever bending strength of a ladder or step stool shall be measured by applying an edgewise load to the bottom end of a front side rail.

Use appropriate means to ensure that the test load is applied to the lower end of the side rail, such as removing prior to testing slip-on feet or feet extending below the end of the rail, or using special purpose test fixtures to load the side rail appropriately. The test unit shall be opened and placed on its side, with the steps perpendicular to the ground, as shown in Fig. 24. Combination ladders shall be opened to their stepladder position. The lower side rail shall be clamped to a support and shall be unsupported from the bottom end of the rail to the top of the bottom step. The top surface of the step shall be parallel to the edge of the support.

The test load shall be applied by means of a weight, in accordance with Table 20, for a minimum period of 1 minute, to the extreme bottom end of the upper side rail (see Fig. 24a). The load shall be centrally applied to a 2-inch-long block resting on the full width of the rail web and held in place by a C clamp; the load attachment point on the C clamp shall not be more than 2 inches below the underside of the web of the rail being tested. The weight shall be suspended so that it is acting through the vertical neutral axis of the side rail. The permanent deformation (set) of the upper side rail shall not exceed 1/4 inch. The test load shall then be applied to the extreme bottom end of the lower side rail in a like manner (see Fig. 24b). The allowable permanent deformation (set) of the lower side rail shall not exceed 1/4 inch.

Provided the ladder continues to support the test load, permanent deformation (set) or ultimate failure of any ladder components as a result of the tests, except for the limitation on the maximum allowable permanent deformation (set) of the upper and lower side rails, shall not constitute test failure.

7.5.11.2 Rear Rail Static Cantilever Bending Test

NOTE: This is a design verification test.

The rear rail cantilever bending strength shall be measured by appplying an edgewise load to the bottom end of a rear side rail. Use appropriate means to ensure that the test load is applied to the lower end of the side rail, such as removing prior to testing slip-on feet or feet extending below the end of the rail, or using special purpose test fixture to load the side rail appropriately. The test unit shall be opened and placed on its side, with the horizontal rear braces perpendicular to the ground, as shown in Fig. 24. The lower side rail shall be clamped to a support and shall be unsupported from the bottom end of the rail to the top of the bottom horizontal brace. Guides shall be used on each side of the rear load section to prevent lateral movement of the section when the test load is applied. The test load shall be applied by means of a weight, in accordance with Table 20, for a minimum period of 1 minute, to the extreme bottom end of the upper side rail (see Fig. 24a). The load shall be centrally applied to a 2-inch-long block resting on the full width of the rail and held in place by a C clamp; the load attachment point on the C clamp shall not be more than 2 inches below the underside of the web of the rail being tested. The weight shall be suspended so that it acts through the vertical neutral axis of the rear rail — lower horizontal brace assembly, so as to avoid introducing twisting into the rear rail. The permanent deformation (set) of the upper side rail shall not exceed 1/4 inch. The test load shall then be applied to the extreme bottom end of the lower side rail, in a like manner (see Fig. 24b). The allowable permanent deformation (set) of the lower side rail shall not exceed 1/4 inch.

Provided the ladder continues to support the test load, permanent deformation (set) or ultimate failure of any ladder components as a result of the tests, except for the limitation of the maximum allowable permanent deformation (set) of the upper and lower side rails, shall not constitute test failure.

Table 21
Rail Torsion Test

Duty Rating and Type	Working Load (pounds)	Rail Torsion Test Force (pounds)
Extra heavy duty - Type IA	300	125
Heavy duty - Type I	250	100
Medium duty - Type II	225	75
Light duty - Type III	200	50

7.5.11.3 Front and Rear Rail Dynamic Drop Test

NOTE: This is a design verification test.

The test unit shall be the tallest ladder for each rail size, with the same bottom bracing for each unit tested. The stepladder shall be tested in a closed position, with the ladder horizontal so that the steps are vertical. The top of the ladder shall be supported 6 inches from its top so that the bottom of the lower rail is 24 inches from a concrete floor, as shown in Fig. 25.

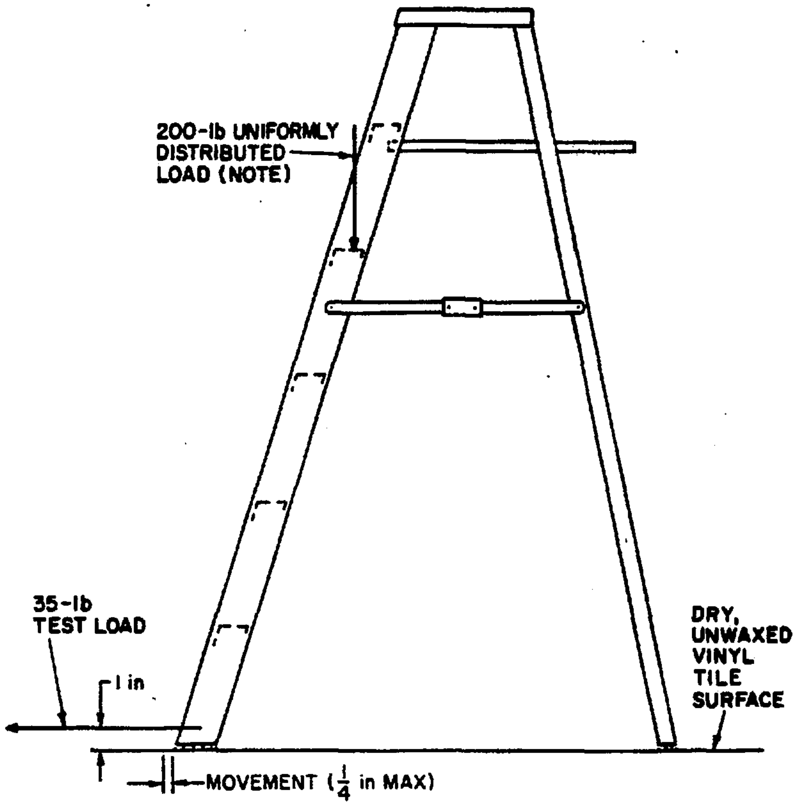
To perform the drop test, the front and rear rails shall be guided in a vertical plane during a free-fall drop. The allowable permanent deformation (set) of the side rail shall not exceed 1/4 inch.

7.5.12 Rail Torsion and Spreader Test

NOTE: This is a design verification test.

The test unit shall be placed on a level floor, in the fully opened position, with the spreaders properly set. A 200-pound distributed dead load, comprising lead weights or the equivalent to maximize the density of the loading medium, shall be applied to the ladder top cap, platform, or top step when no top cap is used. A horizontal force, directed to the rear of the ladder, shall be applied to the ladder top cap at a distance of 18 inches from the vertical centerline of the ladder, as shown in Fig. 22. For articulated ladders, the horizontal force shall be applied as close as possible to the apex hinge. The force shall be perpendicular to the moment arm, with a tolerance of ±10°, when the test load is reached. The front side rail, opposite from the side where the horizontal force is applied, shall be blocked from movement. The test shall be conducted on a dry, unwaxed vinyl tile floor (see 7.1.11).

The test unit shall withstand a horizontal force of not less than the value given in Table 21 without the spreaders unlocking, any damage or visible weakening of the ladder or components, or any significant visible major permanent deformation (set) of the test unit


200-lb UNIFORMLY DISTRIBUTED LOAD (NOTE)
35-lb TEST LOAD
1 in
DRY, UNWAXED VINYL TILE SURFACE
MOVEMENT ($\frac{1}{4}$ in MAX)

NOTE: The 200-pound distributed load shall be placed on the second highest step.

Fig. 26
Stepladder Slip Test

upon release of the test force. Minor permanent deformation (set) of individual ladder components, such as diagonal braces or rear horizontal braces, of less than 1/8 inch shall not constitute test failure.

Ladders equipped with a bucket shelf shall be tested with the bucket shelf in the in-use position. This test is not applicable to step stools.

7.5.13 Stepladder Slip Test

NOTE: This is a design verification test.

Stepladders shall be tested for skid resistance as shown in Fig. 26. The test unit shall be a 6-foot stepladder, fully opened. When testing an articulated ladder, the test unit shall be a 6-foot ladder or the shortest size greater than 6-foot, fully opened. A uniformly distributed load of 200 pounds shall be placed on the second highest step. A horizontal pulling force of 35 pounds, statically applied to the bottom of the ladder at a distance of 1 inch above the test surface, shall not cause any movement in excess of 1/4 inch across the test surface. The test surface shall be a dry, unwaxed, vinyl tile floor (see 7.1.11).

7.5.14 Stepladder Plastic Top Cap Reference Material Tests

7.5.14.1 Plastic tops from the initial lot of molding which were employed for performance tests shall be employed to perform the following tests, and the results shall be recorded and retained for future reference.

7.5.14.2 Ten (10) top caps shall be weighed and both the mean and standard deviation determined.

7.5.14.3 The specific gravity or density of the minimum and maximum section thicknesses of plastic top caps shall be determined. The sample size shall be ten (10) and the mean and standard deviation shall be computed.

7.5.14.4 A differential scanning calorimetric test shall be performed to catalog the material for future reference.

7.5.14.5 An infrared analysis of the material shall be performed and the results shall be retained.

7.5.14.6 The Heat Deflection Temperature (HDT) at 264 psi shall be at least 130° F in accordance with ASTM D648-82.

7.5.14.7 Material Tensile Strength Test.

Tensile coupons of the material shall be prepared and shall comply with ASTM D638-86.

Type I. Half the coupons shall be tested as received without any special conditioning, and the other shall be tested after exposure to accelerated weathering as defined by 7.9.5.1 — Accelerated weathering test procedures of ANSI A14.5 for 1,000 hours. Failure occurs when elongation after 1,000 hours is 70% or less than the elongation of the 'as received' material. Alternate criteria is when the area under the stress-strain curve is less than 70% after weathering of the 'as received' curve area.

7.5.14.8 Cold Impact Test.

A full size sample of the top cap shall be subjected to a 5 ft.-lb. impact from a 1.18 lb., 2" diameter guided steel ball after being conditioned for 24 hours at –20° F. The top cap shall be placed on a flat horizontal surface and impact applied to the geometric - center of the top cap. The top cap shall show no signs of cracking after impact.

7.6 Labeling Tests

7.6.1 General. The following procedures are designed to evaluate the suitability of primary hazard (danger and caution), safety use instruction (safety first), and product data information (notice) labels for application to ladders, and the performance of printed labels applied to surfaces representative of those employed in the intended application.

Unless otherwise specified, the labels are applied to the appropriate surfaces and conditioned for 24 hours at 73° F ±5° F and 50% ±5% relative humidity. Satisfactory results are needed on three samples for each test to fulfill the requirements.

It is not intended that the tests shall be conducted on a progressive basis on one set of test samples. After each environmental test, the samples should be conditioned at 73° F ±5° F and 50% ±5% relative humidity for 24 hours before subsequent tests are conducted.

7.6.2 Tests

NOTE: These tests are all design verification tests and should be performed on standard substrates rather than on actual ladders. These substrates shall be aluminum extrusions, 6061-T6 or the equivalent in mechanical properties, of 0.045 to 0.070 inch nominal thickness.

Labels shall be mounted using a 4-1/2 pound weighted roller and then cured for 24 hours before being subjected to test.

7.6.2.1 Adhesion Test. The test shall be conducted on a new label that has not been subjected to other tests in 7.6.2. according to ASTM D903-49 (1978), Test for Peel or Stripping Strength of Adhesive Bonds.[3] A minimum force of 30 ounces shall be required to remove the label.

7.6.2.2 Scratch Resistance Test. The label shall resist defacement or removal when a flat metal blade 1/32-inch thick, held at a right angle to the test panel, is scraped across it. This test shall be run on labels before and immediately after the water immersion test.

7.6.2.3 Water Immersion Test. Applied labels shall be immersed in water, label side down, with the water level a minimum of 1/8 inch above the label, for 48 hours at 75° F. No significant change shall occur in the legibility of the labels or their adhesion to the ladder surface (as evidence by delamination or curling) following the test.

7.6.2.4 Oven Aging Test. Applied labels shall be placed in an oven maintained at a temperature of 158° F (70° C) for 240 hours. No significant change shall occur in the legibility of the labels or in their adhesion to the ladder surface (as evidenced by delamination or curling) following the test.

8. Selection, Care, and Use

8.1 General

8.1.1 For maximum serviceability and safety and to eliminate unnecessary damage to equipment, good safe practices in the use and care of ladder equipment shall be employed by the users. The guidelines discussed in this section constitute the most appropriate and proper procedures for the care and use of ladders.

8.1.2 A comparison of studies within A14 jurisdiction, by government bodies, by other researchers, and in the ILO[4] publication CIS-12, Ladders, indicates a close correlation between major accident causes and the failure to follow guidelines like those provided in this section.

8.1.3 The major causes of falls from self-supported portable ladders are lack of stability and sliding. The major causes of falls from non-self-supporting portable ladders are lateral sliding at the top support, outward sliding at the lower base support, and human slip. Table 22 provides a summary of significant accident causes.

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[3] Available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

[4] Available from the International Occupational Safety and Health Information Centre, International Labour Office, CH 1211, Geneva 22, Switzerland.

Table 22
Summary of Significant Accident Causes

		Possible Factors Involved in Accident				
Ladder Design	Cause of Accident	Base Support or surface	Top Support	Set-Up	User Location	Ladder Selection and Condition
Self-supporting (stepladder)	Stability	Soft Uneven Unstable surface Slipper surface Differences in firmness of surface Slope of surface	Not applicable	Unlocked spreaders One or more feet unsupported Used unstable or insuffficient supports Ladder not close enough to work location User's physical condition	Above "highest standing level" label Reaching out too far, particularly laterally Climbing onto ladder from above Handling heavy loads or unstable objects Applying side load	Too short (size) Incorrect ladder type (IA, I, II, or III) Incorrect style ladder (for example, platform or single versus stepladder) Use of improper equipment (for example, ladder versus scaffold)
	Sliding	Uneven surface Low friction Unstable surface Ice snow or wet surface Slipper surface	Not applicable	Used as a non-self-supporting ladder Ladder not close enough to work location Worn, missing or contaminated feet	Reaching out too far Stepping off ladder Applying side load	Use of improper equipment (for example, ladder versus scaffold) Removal or deterioration of slip-resistant ladder feet
Non-self-supporting (extension and single)	Human slip	Not applicable	Not applicable	Pitch (angle) too steep (especially with flat rungs) User's physical condition or shoes	Descending	Dirty, oily, or icy step surfaces Use of improper equipment (for example, ladder versus scaffold)
	Lateral sliding (left or right) at top support	Uneven surface Differences in firmness of surface Unstable surface	Uneven surface Slippery surface Unstable surface (pole, tree, corner of building, and the like) Ice, snow, or wet surface Insufficient top support	Not tied off Not held at base Inadequate or excessive extension above top support Ladder not close enough to work location Pitch (angle) too steep Feet unsupported or unstable Extension locks not engaged	Getting on or off ladder to roof Reaching out too far laterally Applying side load	Too short or too long (size) Not extended far enough (too steep) Use of improper equipment (for example, ladder versus scaffold)
	Outward sliding at lower base support	Unstable surface Low friction Loose surface Ice, snow, or wet surface Slippery surface	Overextension above top support	Used unstable or insufficient supports Pitch (angle) too flat Ladder not footed Ladder not tied off or blocked Worn, missing or slippery feet Improper selection of feet or skid-resistant bearing surfaces Extension locks engaged	Above "highest standing level" label Sliding tendency increases above ladder working length midpoint Careless climbing onto or off of ladder (from or to roof, and the like) Applying side load	Wrong foor or skid-resistant bearing surface Too long (size) or extended too far Use of improper equipment (for example, ladder versus scaffold)

8.1.4 Proper selection of a ladder is essential for ensuring safety and reducing the potential for accidents.

8.1.5 Proper use of a ladder will contribute significantly to safety. Factors contributing to falls include haste, sudden movements, lack of attention during use, ladder condition (worn or damaged), user's age or physical condition, or both, and the user's footwear.

The likelihood of falls is not increased by the user's excessive weight or size. However, improper climbing posture creating user clumsiness on the ladder may cause falls.

8.1.6 The safe useful life of the ladder is dependent upon its proper in-service care. In-service-use test methods (see Section 7, including the italicized advisory in-service use tests) are available for evaluating the ladder's condition. While ladders are designed for extended service, it is necessary to provide periodic in-service care and maintenance to ensure their continued safe use. Ladders are not designed or intended to possess an infinite safe useful life.

8.1.7 The information provided in the balance of this section principally addresses stepladders and extension ladders. The principles, however, are applicable to all self-supporting and non-self-supporting portable ladders.

8.2 Selection

8.2.1 Portable ladders are designed for one-man use to meet the requirements of the man, the task, and the environment. This section covers the factors involved in making the proper ladder selection. Product information data necessary for proper ladder selection are found on the ladder rail.

8.2.1.1 Duty Rating. Ladders have been designed in four duty classifications:

Duty Rating	*Ladder Type*	*Working Load (pounds)*
Extra heavy duty	IA	300
Heavy duty	I	250
Medium duty	II	225
Light duty	III	200

8.2.1.2 Loading and Service. Users shall give consideration to the length required, the working load, the duty rating, and frequency of use to which the ladder will be subjected. Users shall not overload a ladder.

The following criteria shall be used when purchasing or using a ladder:

(1) *Extra Heavy Duty.* For users requiring a 300-pound working load, such as industry, utilities, contractors, and the like.

(2) *Heavy Duty.* For users requiring a 250-pound working load, such as industry, utilities, contractors, and the like.

(3) *Medium Duty.* For users requiring a 225-pound working load, such as painters, offices, for light maintenance, and the like.

(4) *Light Duty.* For users requiring no more than a 200-pound working load, such as in general household use. Light-duty ladders shall not be used with ladder jacks or scaffold planks, or both.

8.2.1.3 Proper Size.

8.2.1.3.1 Extension Ladders. Selection of proper extension-ladder size requires knowledge of the vertical height or elevation to the top support point. Where the top support is a roof eave, additional working length is needed to permit the required 1- to 3-foot extension beyond this point. The highest standing level shall also be considered, although the actual dimension will change as the ladder is extended. The nominal relationships among size, working length, and height to the top support point are given in Table 23.

8.2.1.3.2 Stepladders. The highest standing level is constant for a specific stepladder. Typical relationships are as follows:

Stepladder Size (feet)	*Recommended Highest Standing Level*
4	1 foot, 11 inches
5	2 feet, 10 inches-2 feet, 11 inches
6	3 feet, 10 inches
7	4 feet, 9 inches-4 feet, 10 inches
8	5 feet, 9 inches-5 feet, 10 inches
10	7 feet, 8 inches-7 feet, 9 inches

The maximum work height is then established by adding the user's height and safe reach to the highest standing level dimension.

8.2.1.3.3 User On-Ladder Location. There are situations in which the use of a particular size ladder creates a gap in the height that can be reached by the user. For example, extension ladders of 28-foot size and longer cannot be used to work on a wall below a certain height becuase the user would be too far out from the wall. Usually the lower portion of the wall can be reached from the ground, which means up to a height of about 7 feet. When this 28-foot extension ladder is closed to 14 feet, working on a wall below 10 feet becomes a problem.

Table 23
Ladder Size, Working Length, and Height*

Extension Ladder Size	Maximum Working Length	Height to Top Support on Wall	Height to Roof Eave with 1- to 3-Foot Extension
16	13	To 12-1/2	9-1/2–11-1/2
20	17	12-1/2–16-1/2	13-1/2–15-1/2
24	21	16-1/2–20	17–19
28	25	20–24	21–23
32	29	24–28	25–27
36	33	28–32	29–31
40	36	32–35	32–34

*All quantities are in feet.

These conditions create a gap between 7 and 10 feet in height where another ladder selection is recommended. To work in this zone, a shorter non-self-supporting ladder or a self-supporting ladder such as a stepladder should be considered.

8.2.1.3.4 Work Site Restrictions on Working Length. In cases where the work site imposes a height restriction on the non-self-supporting ladder's working length, the user may find that longer ladders are not capable of erection at the proper angle of inclination of 75-1/2°. To safeguard against bottom sliding, select a shorter extension ladder or a single ladder.

8.2.2 In choosing between a self-supporting and a non-self-supporting ladder, an important factor to consider is the bottom and top support conditions. A stepladder requires level support for four rails. If such support is lacking or is not convenient, and if a top support is available, an extension ladder might be a better choice. In addition, the top support allows the opportunity to secure or tie off the top to increase stability.

8.2.3 Manufacturers do design and offer certain ladders intended for use by more than one man. These products shall be so identified on their labels and markings.

8.3 Rules for Ladder Use.

8.3.1 Intended Use. Ladder use shall be restricted to the purpose for which the ladder is designed.

8.3.1.1 Ladders shall not be climbed by more than one person at a time unless designed to support more than one person.

8.3.1.2 Self-supporting ladders shall not be used as single ladders or in the partially closed position.

8.3.1.3 Unless specifically designed for a cantilever operation, a non-self-supporting ladder shall not be used to climb above the top support point.

8.3.1.4 Combination ladders, when used as self-supporting stairway ladders, shall not be climbed on their back sections.

8.3.1.5 A ladder jack system shall not be used by more than two persons (see 8.3.1.9).

8.3.2 Climbing and Working Locations. The user shall climb or work with the body near the middle of the step or rung. The user shall not step or stand higher than the step or rung indicated on the label marking the highest standing level of a ladder. The user shall not step or stand on:

(1) A ladder top cap and the top step of a step or trestle ladder, or the bucket or pail shelf of a self-supporting ladder.

NOTE: This restriction is not applicable to top steps located 18 inches under the top cap.

(2) The rear braces of a self-supporting ladder unless they are designed and recommended for that purpose by the manufacturer.

(3) The top step of the extension section of an extension trestle ladder.

(4) The top cap or top step of a combination ladder when it is used as a self-supporting ladder.

8.3.3 Angle of Inclination. Portable non-self-supporting ladders should be erected at a pitch of 75-1/2° from the horizontal for optimum resistance to sliding, strength of the ladder, and balance of the climber. A simple rule for setting up a ladder at the proper angle is to place the base a distance from the wall or upper support equal to one-quarter the effective working length of the ladder (the "quarter length rule"). Effective working length is the distance along the side rails from the bottom of the support point of the upper portion of the ladder. Combination ladders should be erected so that the step surfaces are in a horizontal plane.

8.3.4. **Footing Support.** The ladder base shall be placed with a secure footing on a firm, level support surface. Ladder levelers may be used to achieve equal rail support on uneven surfaces. Devices such as shoes, spurs, spikes, combinations thereof, or similar devices of substantial design should be installed where required for slip resistance and bearing area. Where ladders with no safety shoes, spurs, spikes, or similar devices are used, a foot ladder board or similar device may be employed. Ladders shall not be used on ice, snow, or slippery surfaces unless suitable means to prevent slipping are employed. Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height.

8.3.5 Top Support. The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment. Such an attachment should be substantial and large enough to support the ladder under load. It should be used when the ladder top support is a pole, light standard, or building corner, or in tree-type operations (pruning, fruit picking, and the like). When it is necessary to support the top of a ladder at a window opening, a device should be attached across the back of the ladder, extending across the window, to provide firm support against the building walls or window frames.

8.3.6 Side Loading. Portable ladders are not designed for excessive side loading, and such abuse of the ladder shall be avoided. The ladder shall be kept close to the work. The user shall not overreach, but shall descend and relocate the ladder instead. When using a ladder, the user shall never push or pull unless the ladder is properly secured.

8.3.7 Climbing Ladders. When ascending or descending the ladder, the user shall face the ladder and maintain a firm hold on the ladder. The user shall not climb onto a ladder from the side, from one ladder to another, or from a swing-stage to a ladder, unless the ladder is secured against sideways motion or has been tied to the structure. The user shall not climb a broken or bent ladder or a ladder that does not comply with 8.4.1.

8.3.8 Electrical Hazards. Users are cautioned to take proper safety measures when ladders are used in areas containing electrical circuits. These precautions should prevent any contact or possible contact with an energized, uninsulated circuit or conductor in order to avoid electrical shock or short circuit.

Metal ladders and wood ladders with side-rail metal reinforcement wires shall not be used where they would come in contact with exposed energized electric wires. All ladders should be kept away from electric power lines unless they are specifically designed for that application. Ordinary precautions should be employed as would be taken when using any tool that may become a conductor of electricity. Users are cautioned to be particularly careful when manipulating any ladder around an overhead electrical power line.

8.3.9 Improper Use. A ladder shall not be used as a brace, skid, lever, guy or gin pole, gangway, platform, scaffold plank, material hoist, or for any other use for which it was not intended, unless such use is specifically recommended by the manufacturer. Ladders shall not be erected on scaffolds to gain additional height, unless specifically designed for that application.

8.3.10 Access to Roof. When single section or extension ladders are used to gain access to a roof, the top of the ladder shall extend at least 1 foot and no more than 3 feet above the point of support at the eaves, gutter, or roof line. The ladder should be tied down to prevent slipping before the user ascends onto the roof. The user shall take care when ascending from the ladder to the roof or descending from the roof to the ladder to avoid tipping the ladder over sideways or causing the ladder base to slide.

8.3.11 Fastening Together. Ladders and ladder sections, unless so designed, shall not be tied or fastened together to provide a longer length. Ladders and ladder sections shall not have their length increased by other means unless specifically designed for the means employed.

8.3.12 Doorways. Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.

8.3.13 Set-Up and Adjustment of Ladders

8.3.13.1 Extension Ladders. Adjustment of extension ladders shall only be made by the user when standing at the base of the ladder so the user may observe when the locks are properly engaged. The user shall check that the rope is tracking correctly in the pulley. Adjustment of extension ladders from the top of the ladder (or any level over the locking device) is a dangerous practice and shall not be attempted. Adjustments shall not be made while anyone is standing on the ladder. The user shall ensure that both upper and lower ladder support points are contacting firm support surfaces. Extension trestle ladders and combination ladders used in non-self-supporting positions require that the same procedures be observed.

8.3.13.2 Stepladders. The user shall ensure that the stepladder is fully opened, with spreaders locked and all feet contacting firm level support surface.

8.3.14 Erection of Extension Ladders. Extension ladders shall always be erected so that the top section (fly section) is above and resting on the bottom section (base section) with the rung locks engaged.

The top section may be located in front of or behind the bottom section, depending upon the design. The ladder shall never be used in a reverse position where the top end of the fly section becomes the lower end of the ladder, and the lower end of the base section becomes the upper end of the ladder. Where extension ladders have been previously used as single ladders, care should be exercised to ensure that the sections are properly reassembled and that the interlocking guides or brackets are properly engaged between the sections before further use.

8.3.15 Relocating Ladders. A ladder shall not be relocated while anyone is on it.

8.3.16 Bracing of Stepladders. The bracing on the rear rails of stepladders is designed solely for increasing stability and not for climbing. This does not apply to stepladders provided with steps for climbing on both front and rear sections.

8.3.17 Use of Individual Sections of Sectional Ladders and Sections of Extension Trestle Ladders. Middle and top sections of sectional or window cleaners' ladders should not be used for bottom sections. Extension sections of extension trestle ladders should not be used as single ladders unless the user equips them with safety shoes or the equivalennt.

8.3.18 Hooks. When service conditions warrant, hooks may be attached at or near the top of portable ladders to give added security (such hooks are used for upper support in cable strand or roofing applications.)

8.3.19 Ladder Jacks. Only extra-heavy-duty (type-IA) and heavy-duty (type-I) ladders shall be used in conjunction with ladder jacks and stages or planks. Light-duty (type-III) and medium-duty (type-II) ladders shall never be used with ladders jacks. For additional information on ladder jack systems, see American National Standard Safety Requirements for Scaffolding, ANSI A10.8.19.

8.3.20 Ladders Designed for Special Uses. Certain ladders are designed, specified, and identified, as two-man working load products. Included in this group are trestle ladders, extension trestle ladders, combination ladders, and double stepladders.

8.3.21 High Static Electrical Fields. Metal ladders or other ladders specifically designed to permit grounding or dissipation of static electricity should be used around high static electrical fields to assist in preventing shocks to the user.

8.4 Care

8.4.1 Inspection. A thorough ladder inspection shall be made when the ladder is originally purchased, received, and put into service. The ladder shall be inspected periodically, preferably before each use. Working parts and rung/step-to-side-connections shall be checked. Where structural damage or other hazardous defect is found, the ladder shall be taken out of service and either discarded or repaired by a competent mechanic.

8.4.1.1 Tipping Over, and Other Impact Damage.

The ladder shall be inspected for side-rail dents or bends, or excessively dented rungs. All rung/step-to-side-rail connections shall be checked, as well as hardware connections, rivets (for shear), and all other components.

8.4.1.2 Exposure to Fire. If ladders are exposed to excessive heat, as in the case of fire, their strength may be reduced. After such exposure the ladder shall be inspected visually for damage and tested for deflection and strength characteristics. More information is provided in Section 7. In doubtful cases, refer to the manufacturer.

8.4.1.3 Corrosive Substances. When ladders are to subjected to certain acids or alkali materials that may be chemically corrosive and significantly reduce the working load of the ladder, consult the manufacturer or a qualified person prior to such exposure.

8.4.1.4 Oil and Grease. Ladders should be free of oil, grease, or slippery materials on climbing or gripping surfaces.

8.4.1.5 Ropes and Pulleys. Ropes, cables, and pulleys should be inspected frequently, checked to ensure that they operate properly, and replaced if they are worn or defective.

8.4.2 Damaged Ladders. Broken or bent ladders shall be marked and taken out of service until they are repaired by a competent mechanic or destroyed in such a manner as to render them useless. The user shall not attempt to repair a defective side rail.

8.4.3 Proper Handling. Ladders, like any tool, must be handled with care not not be subjected to dropping, jarring, or misuse. They are designed for the purpose intended. Therefore, any variation from this purpose constitutes a mishandling of the equipment.

8.4.4 Transporting. Ladders transported on road, street, and highway motor vehicles shall be properly supported. Overhang of the ladders beyond supporting points should be limited. Supporting points should be of a material such as wood or rubber-covered iron pipe, to minimize chafing and the effects of road shock. Securing the ladder to each support point will greatly reduce damage due to road shock.

8.4.4.1 Truck Racks. Ladders shall be secured to the truck rack in a manner that will avoid chafing from relative horizontal and vertical motion. The ladder feet, when present, should be secured from pivoting about the ladder while the vehicle is in motion. The ladder truck rack shall be designed to positively secure the ladder into a fixed position, and the rack should be designed to positively secure the ladder into a fixed position, and the rack should be designed to fit the particular ladder being fixed to the truck. If these requirements are not satisfied, excessive wear of the ladder will occur, which will cause premature deterioration of the ladder and reduce its service life. Improperly designed and used truck racks may damage side rails, steps or rungs, feet, and other ladder parts, owing to vehicle vibration and road shock.

8.4.5 Storage. Ladders should be stored in or on racks designed to protect the ladder when it is not in use. These racks should have sufficient supporting points to avoid sagging. Materials shall not be placed on the ladder while it is in storage.

8.4.6 Maintenance. Proper ladder maintenance ensures the safe condition of the ladder. Hardware, fittings, and accessories should be checked frequently and kept in proper working condition. All pivotable connections and the rung-lock cam surfaces should be lubricated frequently. All bolts and rivets shall be in place and secure before using a ladder, and no ladders should be used if any bolts or rivets or missing or if the joints between the steps (or rungs) and the side rails are not tight.

Ladders with safety shoes or padded feet which are excessively worn shall be taken out of service until repaired.

9. Labeling/Marking Requirements

9.1 General Requirements

9.1.1 Primary hazard "DANGER" and "CAUTION" markings shall conform to the general design principles (and where labels are used) to the design and color principles of these requirements as provided in Appendices "A" and "B" for the kinds of ladders in this standard. Appendix B refers to the "SAFETY FIRST" and "NOTICE" labels/markings.

9.1.2 Markings shall be legible and readily visible.

9.1.3 The preferred locations of the markings, especially "DANGER" and "CAUTION" markings, should be approximately 4-1/2 feet to 6 feet from the bottom of the ladder on the outside of the rails (climber facing the ladder) with the ladder in the "use" position.

9.1.4 For ladder less than 6 feet in length, markings should be located as close to the top as practicable.

9.1.5 Markings shall be positioned so that other parts of the ladder shall not damage the label/marking when the ladder is open, closed or extended.

9.1.6 The labels/markings in the appendices shall be considered as illustrations only. For example, marking #5 can have fly section either over or under base section. Also, illustrations in this standard may not be optimum size — see Appendix for size notes.

9.1.7 Exception. Modification of these marking requirements within the design or color principles, of Section 9, including equivalent wording and symbols to accommodate material, finish and construction features shall be permitted.

9.1.8 Marking no. 00 shall be placed on all portable ladders as the uppermost marking on the outside of the right rail (climber facing the ladder).

9.2 Product Data Information Markings

9.2.1 The product data information markings in 9.2.2 shall appear on the outside of the lower left rail (climber facing the ladder) and where possible, approximately 4-1/2 to 6 feet from the bottom of the ladder.

9.2.2 The following required information shall be preceded by the word "NOTICE" in boldface and preferably shall be in the following sequence:

(1) Ladder size.
(2) Type and duty rating.
(3) Maximum working length (if extension ladder).
(4) Highest standing level.
(5) Total length of sections (if extension ladder).
(6) Model number or name.
(7) Manufacturer or distributor name (may be logo).
(8) Manufacturing plant (if multiplant organization may be coded).
(9) Month and year of manufacture.
(10) ANSI standard compliance.
(11) Warranty, if offered (optional).

9.2.3 Preferred Presentation. Product data information markings shall preferably be presented as provided by the labels/marking and instructions in Appendix B (See Marking #23),

9.3 Specific Labeling/Marking Requirements

9.3.1 Stepladder

9.3.1.1 Marking #1 shall meet the general requirements of location and positioning to avoid damage to label/marking.

9.3.1.2 Marking #2 shall be located on the top cap of stepladders.

9.3.1.3 Marking #3 shall be located on the first step below the top cap when this step is 18 inches or less from the top and may be omitted when the first step is more than 18 inches from the top cap.

9.3.1.4 The placement of Markings #2 and #3 shall be such as to assure best viewing position and to accommodate design, construction features and materials and finishes.

9.3.1.5 Marking #4 shall meet the general requirements in Section 9.1.

9.3.2 Extension and Single Section Straight Ladders

9.3.2.1 Marking #5 and #6 shall meet the general requirements for location.

9.3.2.2 Marking #6 shall be used on all extension ladders and single section straight ladders constructed of metal.

9.3.2.3 Markings #7 and #8 may be used together if it is so desires.

9.3.2.4 Mark #7 shall be placed in lieu of Marking #8, on the inside of the right rail of the fly section of the extension ladders, with the arrow pointing to the second or third rung, depending upon which rung is 22 inches or more from the top of the fly section, either of which locations shall be the highest standing level.

9.3.2.5 Marking #8 shall be placed in lieu of Marking #7 on the second rung from the top when the second rung is 22 inches or more from the top of the fly section or placed on the third rung from the top when the second rung is less than 22 inches from the top of the fly section, either of which location shall be the highest standing level.

9.3.2.6 Marking #9 shall be permitted in lieu of embossed letters on extension ladders not equipped with permanent means to preclude removal.

9.3.2.7 Marking #10 shall meet the general requirements in Section 9.1 including equivalent wording in the text.

9.3.3 Step Stool

9.3.3.1 Markings #11 and #12 shall conform to the general requirements in Section 9.1.

9.3.4 Trestle Ladder (Double Front Ladder)

9.3.4.1 Marking #7 shall be placed on the inside of the right rail of the trestle ladder with the arrow of the label/marking pointing to the second step or rung.

9.3.4.2 Marking #8 shall be located on the second step or rung from the top of the ladder.

9.3.4.3 Markings #7 and #8 may be used together if so desired.

9.3.4.4 Markings #13 and #14 shall meet the general requirements in Section 9.1.

9.3.5 Extension Trestle Ladder

9.3.5.1 When the extension section in the trestle ladder is used, #7 and #8 shall be used as required for single section straight ladders.

9.3.5.2 Markings #7 and #8 may be used separately if so desired.

9.3.5.3 Marking #15 shall meet the general requirements in Section 9.1.

9.3.6 Platform Ladder

9.3.6.1 Marking #1 shall meet the general requirements of location and positioning to avoid damage to the label/marking.

9.3.6.2 Marking #2 shall be located on the top cap or highest cross member above the platform.

9.3.6.3 Marking #3 shall be located on the step which is the platform.

9.3.6.4 Where an electrocution hazard exists, Marking #5 shall be located on platform ladders in accordance with the general requirements in Section 9.1.

9.3.6.5 Marking #18 shall conform to the general requirements in Section 9.1.

9.3.7 Combination Ladder

9.3.7.1 In the stepladder mode, Markings #1, #2 and #3 shall meet the requirements set forth for stepladders.

9.3.7.2 In the single or extension ladder mode, Marking #5, #6, #7 and #8 shall meet the requirements set forth for single and extension ladders.

9.3.7.3 Marking #16 shall meet the general requirements in Section 9.1.

9.3.7.4 Marking #17 shall meet the general requirements in Section 9.1.

9.3.8 Articulating Ladders

9.3.8.1 Markings #4, #5, #6 and #19 shall meet the general requirements in Section 9.1.

9.3.8.2 Marking #20 shall be located on the outside of both siderails as near to the center hinge as possible with one marking in an upside down (inverted 180°) position and the other right side up.

Exception: Since the definition of marking allows for stamping and embossing, a combination of stamping/embossing and color coding shall be permitted to meet the precautionary warning intent of this marking.

9.3.8.3 Marking #21 shall be located on the outside of both inner siderails as near to the center hinge as possible with one marking in an upside down (inverted 180°) position and the other right side up.

9.3.8.4 Marking #22 shall be located on the outside of one of the siderails when the ladder is in the folded (storage) position.

10. Revision of American National Standards Referred to in This Document

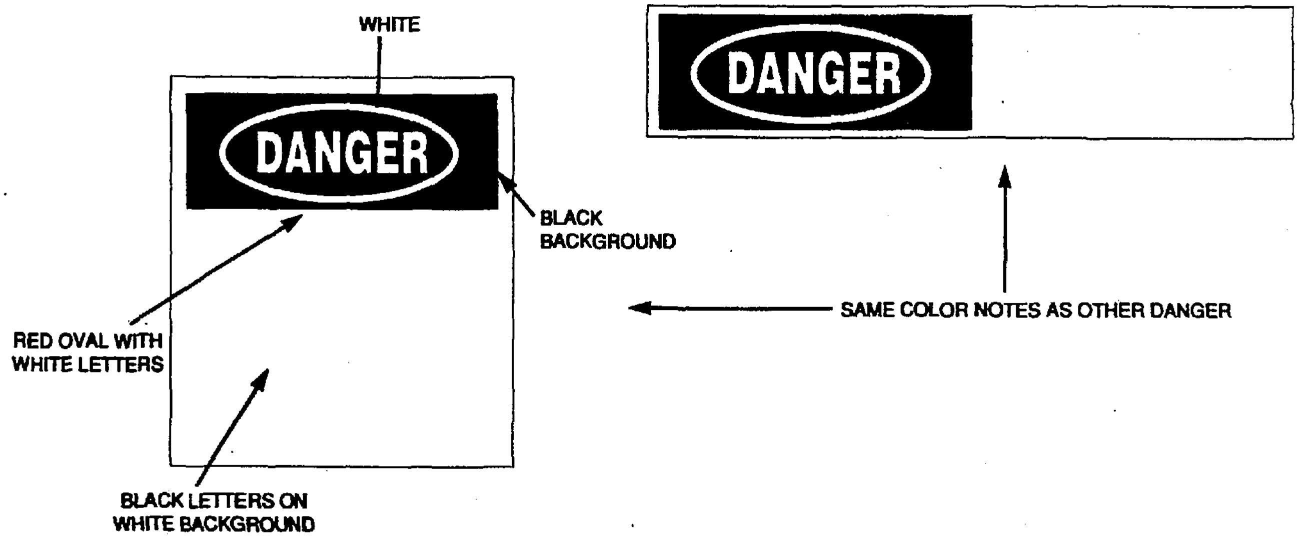
When the American National Standards referred to in this document are superseded by a revision approved by the American National Standards Institute, Inc., the revision shall apply.

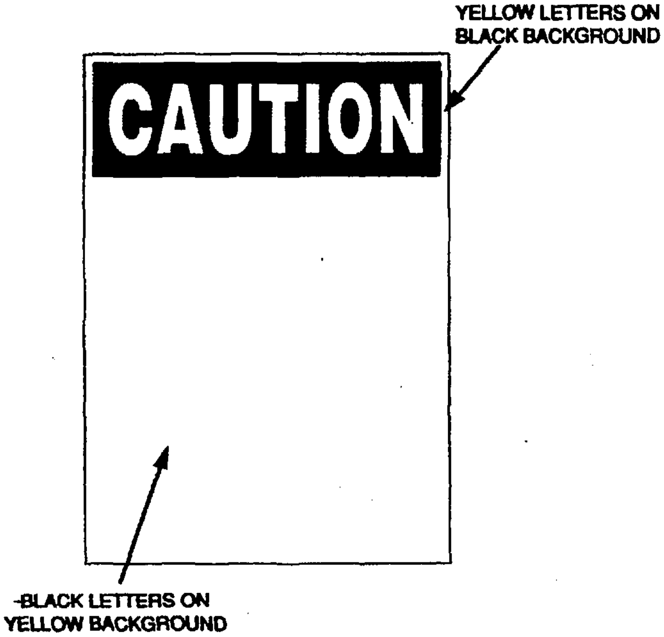
Appendixes

(These Appendixes are not a part of American National Standard A14.2-1990, but are included for information purposes only.)

Appendix A

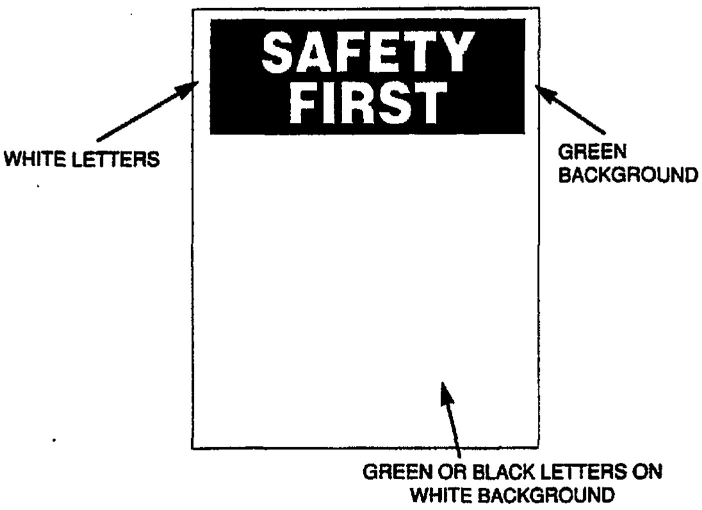
NOTE: The following are the preferred design and color principles for the primary hazard "DANGER", and "CAUTION" labels/markings for the kinds of portable metal ladders cited in this standard. These labels/markings are illustrations of typical labels/markings and are not actual recommended size. The minimum recommended size is 2 inches x 8 inches.

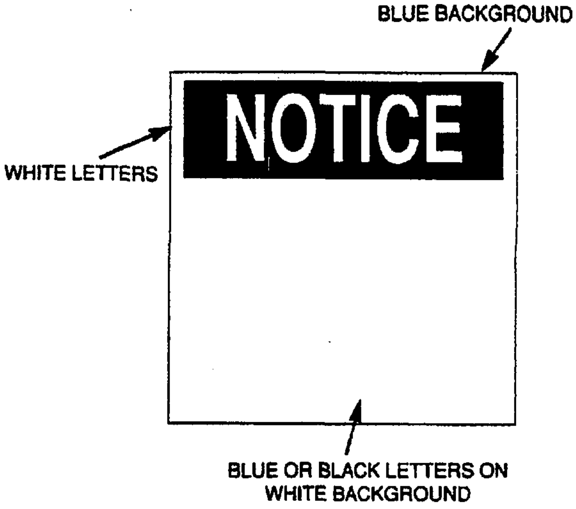

WHITE
DANGER
BLACK BACKGROUND
RED OVAL WITH WHITE LETTERS
BLACK LETTERS ON WHITE BACKGROUND
DANGER
SAME COLOR NOTES AS OTHER DANGER


YELLOW LETTERS ON BLACK BACKGROUND
CAUTION
BLACK LETTERS ON YELLOW BACKGROUND

Appendix B

NOTE: The following are the preferred design and color principles for "SAFETY FIRST" (safety instructions) and "NOTICE" (product data information) labels/markings for the kinds of portable metal ladders cited in this standard. These labels/markings are illustrations of typical labels/markings and are not actual recommended size. The minimum recommended size is 2 inches x 8 inches.





Preferred Presentation of Product Data Information Markings

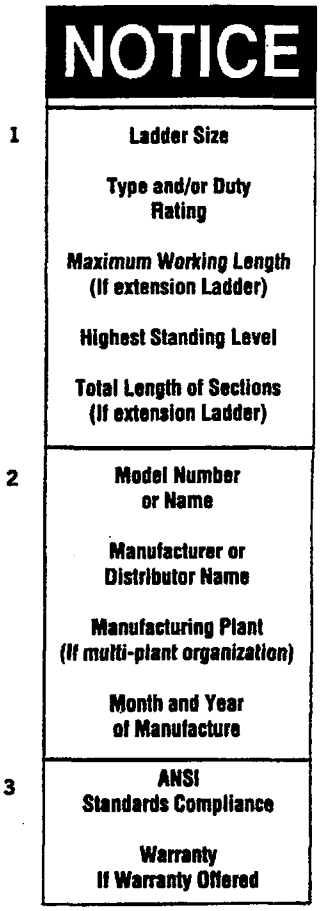
The preferred presentation is not mandatory, but if it is used, it should be used in the panel sequence illustrated in Marking No. 23. If necessary, elements may be rearranged, as multiple panels are used. However, any panel which includes the data of panel no. 1 should be shown with the word "NOTICE" as illustrated in Marking No. 23.

The best method would be to present the notice and three panels as one label or marking. This method would mean the month and year date, for economic use of preprinted labels, would have to be entered by ink stamp for the one-label approach. Permanent inks should be sought — and are available — for such applications. In fact, if this information is stamped or burned, the rest of the marking can be a label or similarly stamped or burned, as long as the one-label effect is maintained.

The three panels are also designed to be divided between panels no. 1 and 2 and panels no. 2 and 3. The notice and panel no. 1 should be presented as one unit either in a label or other marking, since this product information is most critical in selecting the right ladder. Such information provides the necessary elements of a sound purchase that allows the user to match his needs and requirements to the capabilities of the ladder.

Panel no. 2, if separated, may be stamped, burned, embossed, or otherwise marked, including a label which provides for ink stamping of month and year data. An effort should be made to avoid the placement of other markings between panels which are separated. In fact, the information in panel no. 2 may be placed elsewhere if it is first placed as required by 9.2. Additonally, the optional character of panel no. 3 may eliminate its use or incorporate its information in either panel no. 1 or 2.

Manufacturer's and distributor's name may be a logo. Manufacturing plant (if multi-plant organization) may be coded.



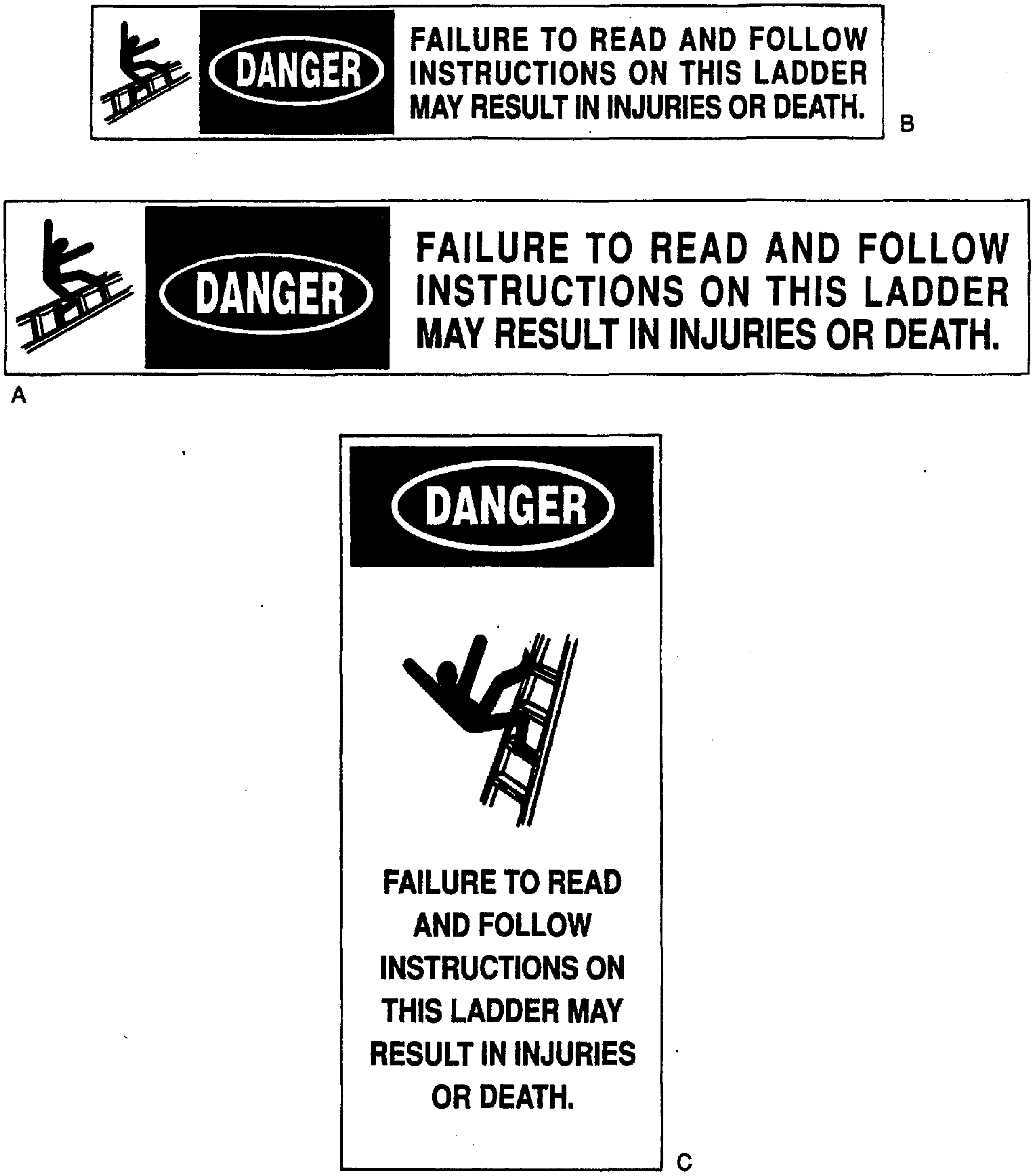
NOTICE

1
Ladder Size
Type and/or Duty Rating
Maximum Working Length (If extension Ladder)
Highest Standing Level
Total Length of Sections (If extension Ladder)

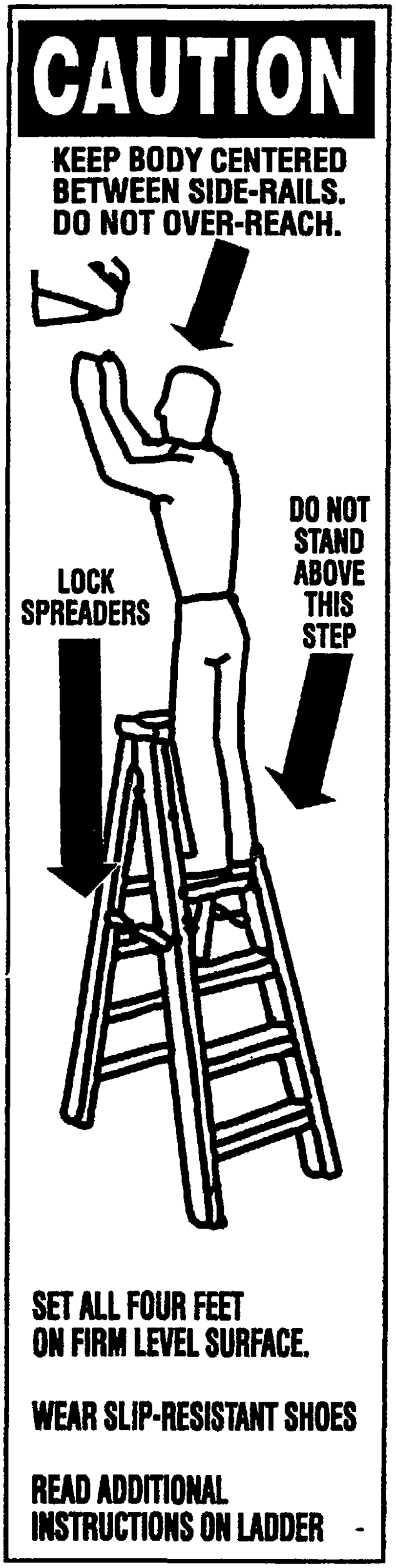
2
Model Number or Name
Manufacturer or Distributor Name
Manufacturing Plant (If multi-plant organization)
Month and Year of Manufacture

3
ANSI Standards Compliance
Warranty If Warranty Offered

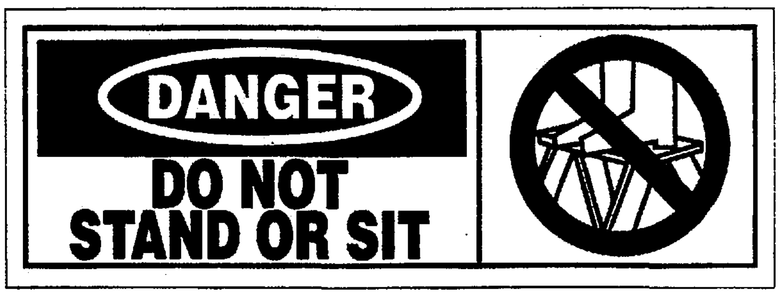
Marking No. 23
Preferred Notice Presentation


DANGER
FAILURE TO READ AND FOLLOW INSTRUCTIONS ON THIS LADDER MAY RESULT IN INJURIES OR DEATH.
B
DANGER
FAILURE TO READ AND FOLLOW INSTRUCTIONS ON THIS LADDER MAY RESULT IN INJURIES OR DEATH.
A
DANGER
FAILURE TO READ AND FOLLOW INSTRUCTIONS ON THIS LADDER MAY RESULT IN INJURIES OR DEATH.
C

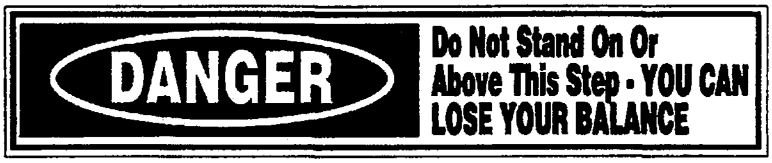
Marking No. 00 (A, B, C)


CAUTION
KEEP BODY CENTERED BETWEEN SIDE-RAILS. DO NOT OVER-REACH.
LOCK SPREADERS
DO NOT STAND ABOVE THIS STEP
SET ALL FOUR FEET ON FIRM LEVEL SURFACE.
WEAR SLIP-RESISTANT SHOES
READ ADDITIONAL INSTRUCTIONS ON LADDER

Marking No. 1

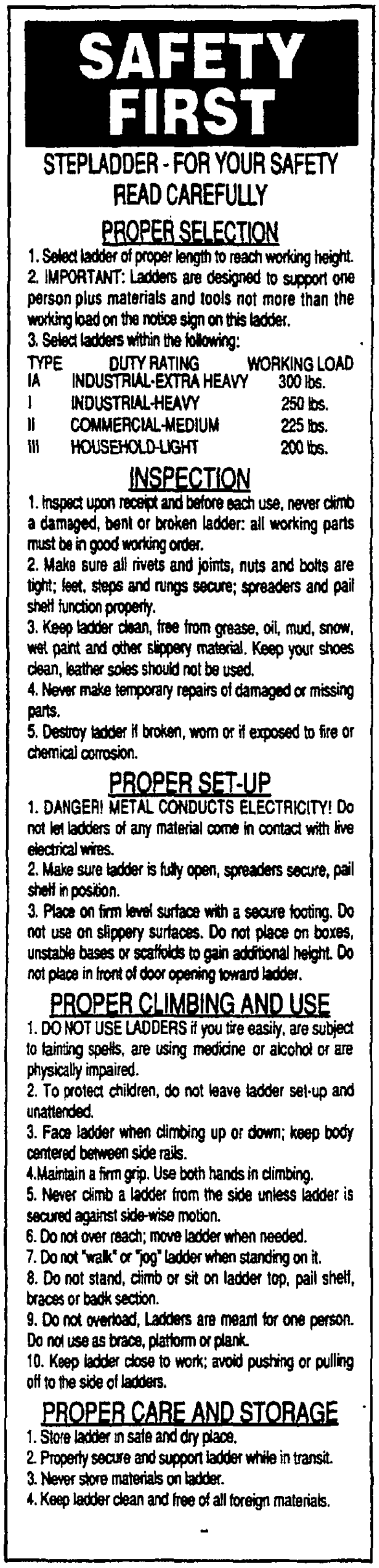

DANGER
DO NOT STAND OR SIT

Marking No. 2


DANGER

Do Not Stand On Or Above This Step - YOU CAN LOSE YOUR BALANCE

Marking No. 3



SAFETY FIRST

STEPLADDER - FOR YOUR SAFETY
READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken ladder: all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight; feet, steps and rungs secure; spreaders and pail shelf function properly.
3. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL CONDUCTS ELECTRICITY! Do not let ladders of any material come in contact with live electrical wires.
2. Make sure ladder is fully open, spreaders secure, pail shelf in position.
3. Place on firm level surface with a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height. Do not place in front of door opening toward ladder.

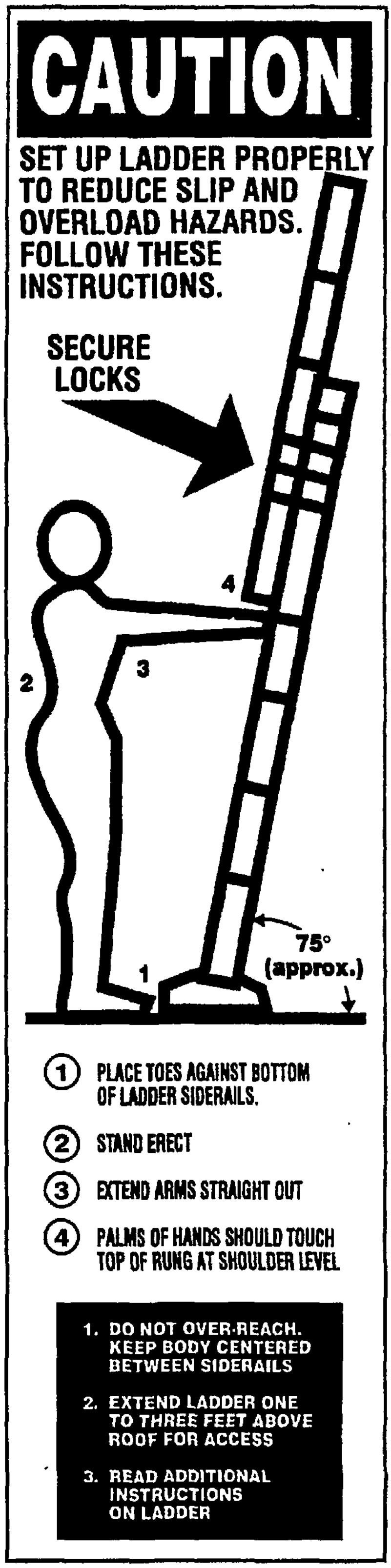
PROPER CLIMBING AND USE

1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set-up and unattended.
3. Face ladder when climbing up or down; keep body centered between side rails.
4. Maintain a firm grip. Use both hands in climbing.
5. Never climb a ladder from the side unless ladder is secured against side-wise motion.
6. Do not over reach; move ladder when needed.
7. Do not "walk" or "jog" ladder when standing on it.
8. Do not stand, climb or sit on ladder top, pail shelf, braces or back section.
9. Do not overload, Ladders are meant for one person. Do not use as brace, platform or plank.
10. Keep ladder close to work; avoid pushing or pulling off to the side of ladders.

PROPER CARE AND STORAGE

1. Store ladder in safe and dry place.
2. Properly secure and support ladder while in transit.
3. Never store materials on ladder.
4. Keep ladder clean and free of all foreign materials.

Marking No. 4



CAUTION

SET UP LADDER PROPERLY TO REDUCE SLIP AND OVERLOAD HAZARDS. FOLLOW THESE INSTRUCTIONS.

① PLACE TOES AGAINST BOTTOM OF LADDER SIDERAILS.

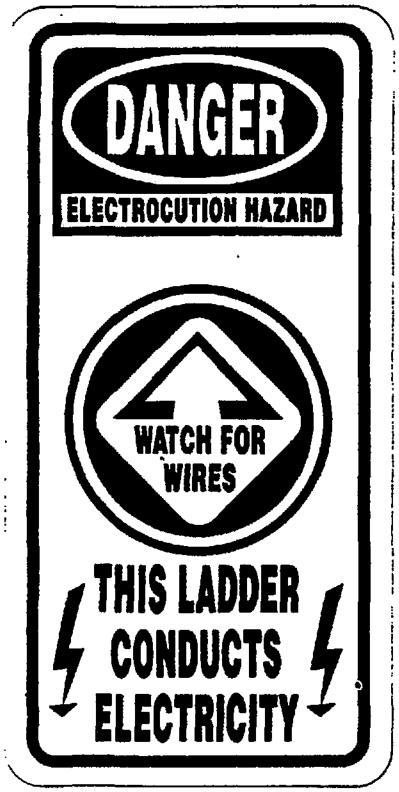
② STAND ERECT

③ EXTEND ARMS STRAIGHT OUT

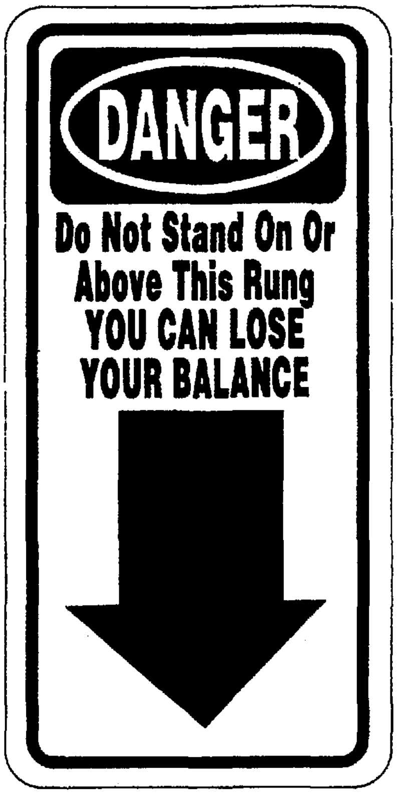
④ PALMS OF HANDS SHOULD TOUCH TOP OF RUNG AT SHOULDER LEVEL

1. DO NOT OVER-REACH. KEEP BODY CENTERED BETWEEN SIDERAILS
2. EXTEND LADDER ONE TO THREE FEET ABOVE ROOF FOR ACCESS
3. READ ADDITIONAL INSTRUCTIONS ON LADDER

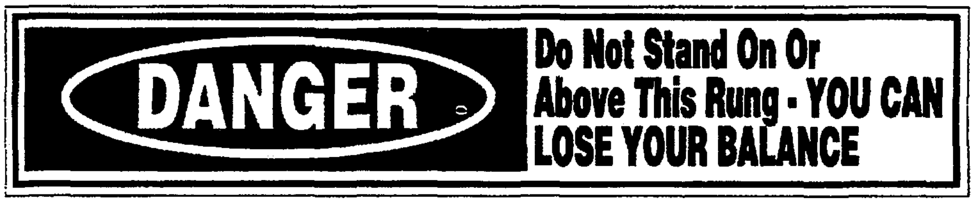
Marking No. 5



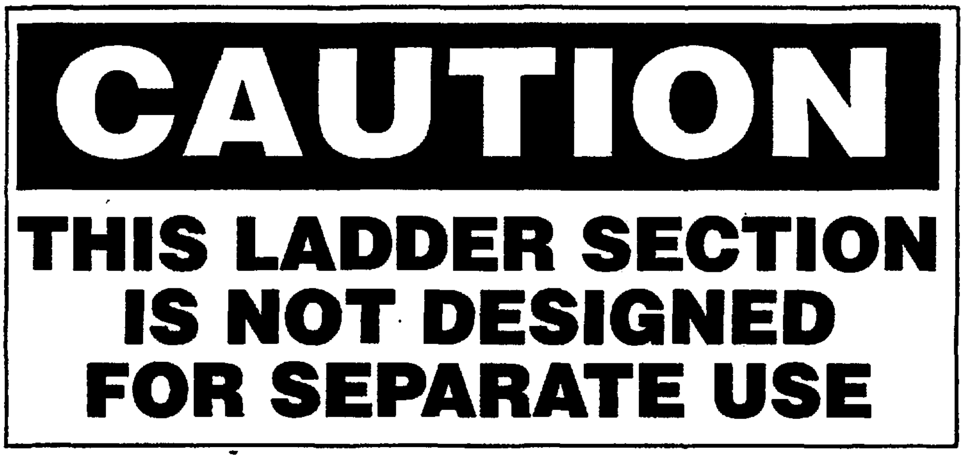
Marking No. 6



Marking No. 7


DANGER
Do Not Stand On Or
Above This Rung - YOU CAN
LOSE YOUR BALANCE

Marking No. 8



Marking No. 9

SAFETY FIRST

EXTENSION LADDER - FOR YOUR SAFETY READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use.
2. Make sure all rivets and joints, nuts and bolts are tight, rungs secure, ladder extension jacks and feet functioning, and if necessary lubricate, and rope properly attached and in good condition.
3. Never climb a damaged, bent or broken ladder.
4. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
5. Never make temporary repairs of damaged or missing parts
6. All working parts must be in good working order.
7. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion

PROPER SET-UP

1. DANGER! METAL LADDERS CONDUCT ELECTRICITY! Do not let ladders of any material come in contact with live electrical wires.
2. Secure base when raising extension and never set up ladder when it is extended.
3. Set single or extension ladder at proper 75-1/2 degree angle by bracing ladder base a distance equal to 1/4 total working length of ladder away from base of vertical support. If distance is less than 3 ft., place base of ladder a minimum of 3 ft. from vertical support.
4. Set ladder on firm ground. Do not lean sideways. Do not use on ice or snow or slippery surface without non-skid devices or securing feet.
5. Erect ladder with minimum 3 ft. extending above roof line or working surface: tie top at support points.
6. Extend top section only from ground, never by "bouncing" or from the roof.
7. Do not over-extend - maintain maximum overlap of sections up to and including 36 ft. - 3 ft. over 36 ft. and including 48 ft. - 4 ft.; over 48 ft. - 5 ft.
8. Place on a firm surface and a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height.
9. Do not place in front of door opening toward ladder.
10. Where possible use second person to hold ladder.

PROPER CLIMBING AND USE

1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set-up and unattended.
3. Securely engage ladder locks before climbing. Check that top and bottom ends of ladder rails are firmly supported.
4. Face ladder when climbing up or down; keep body centered between side rails.
5. Maintain a firm grip. Use both hands in climbing.
6. Do not climb onto a ladder from the side unless ladder is secured against side-wise motion, or climb from one ladder to another.
7. Do not stand closer to the top than 3 ft. from the top, never climb above the top support.
8. Do not use ladder in high winds.
9. Never use ladder as a platform, plank or hoist. Never use ladder on a scaffold. Do not overload. Ladders are meant for one person.
10. Keep ladder close to work; avoid pushing or pulling off to side of ladder.
11. Never drop or apply an impact load to ladder.
12. Do not "walk" or "shift" ladder while standing on it.

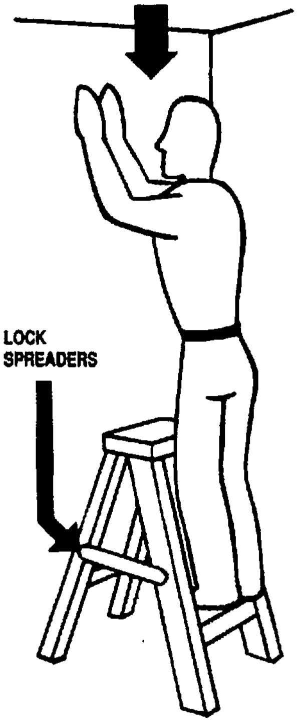
PROPER CARE AND STORAGE

1. Hang ladder on racks in dry place at intervals of 6 feet for support.
2. Properly secure and support ladder while in transit.
3. Never store materials on ladder.
4. Keep ladder clean and free of all foreign materials.

Marking No. 10

CAUTION

KEEP BODY CENTERED BETWEEN SIDE RAILS DO NOT OVER-REACH.



SET ALL FOUR FEET ON FIRM LEVEL SURFACE

WEAR SLIP-RESISTANT SHOES

READ ADDITIONAL INSTRUCTIONS ON LADDER

Marking No. 11

SAFETY FIRST

STEP STOOL - FOR YOUR SAFETY READ CAREFULLY

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken step stool, all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight, steps and rungs secure, spreaders function properly.
3. Keep step stool clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy step stool if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL STEP STOOLS CONDUCT ELECTRICITY! Do not let step stools of any material come in contact with live electrical wires.
2. Make sure step stool is fully open and spreaders secure.
3. Place on a firm surface and a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height. Do not place in front of door opening toward ladder.

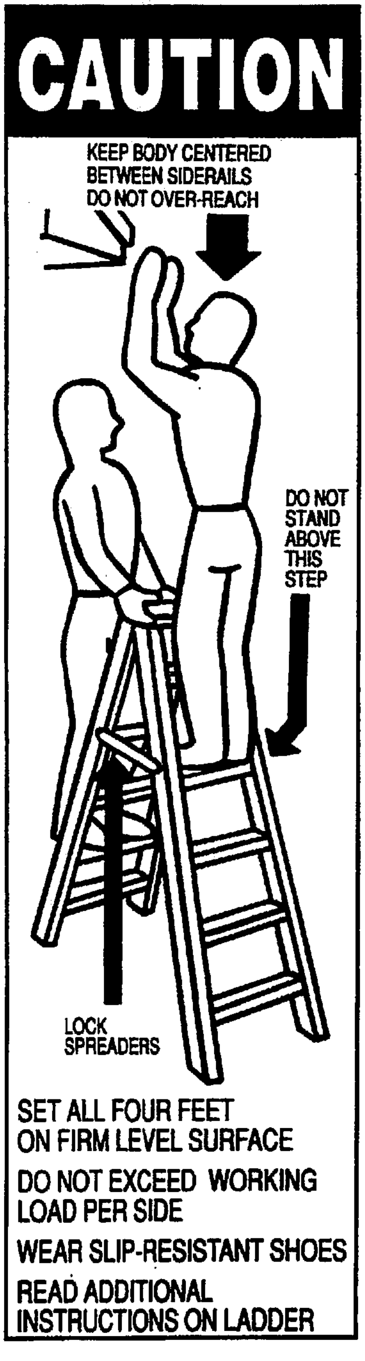
PROPER CLIMBING AND USE

1. DO NOT USE STEP STOOLS if you tire easily, are subject to fainting spells, using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set up and unattended.
3. Face step stool when climbing up or down. Keep body centered between side rails.
4. Do not over reach, move step stool when needed.
5. Do not "walk" or "jog" ladder when standing on it.
6. Do not overload. Step stools are meant for one person. Do not use as a brace, platform or plank.
7. Keep step stool close to work; avoid pushing or pulling off to side of step stools.

PROPER CARE AND STORAGE

1. Store step stool in safe and dry place.
2. Properly secure and support step stool while in transit.
3. Never store materials on step stool.
4. Keep ladder clean and free of all foreign materials.

Marking No. 12


CAUTION
KEEP BODY CENTERED BETWEEN SIDERAILS DO NOT OVER-REACH
DO NOT STAND ABOVE THIS STEP
LOCK SPREADERS

SET ALL FOUR FEET ON FIRM LEVEL SURFACE

DO NOT EXCEED WORKING LOAD PER SIDE

WEAR SLIP-RESISTANT SHOES

READ ADDITIONAL INSTRUCTIONS ON LADDER

Marking No. 13

SAFETY FIRST

TRESTLE LADDER - FOR YOUR SAFETY READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken ladder, all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight, steps and rungs secure, spreaders function properly.
3. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL LADDERS CONDUCT ELECTRICITY. Do not let ladders of any material come in contact with live electrical wires.
2. Make sure ladder is fully open and spreaders secure.
3. Place on a firm surface and a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height. Do not place in front of door opening toward ladder.

PROPER CLIMBING AND USE

1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set up and unattended.
3. Face ladder when climbing up or down; keep body centered between side rails.
4. Maintain a firm grip. Use both hands in climbing.
5. Never climb ladder from the side unless ladder is secured against side-wise motion.
6. Do not over reach, move ladder when needed.
7. Do not "walk" or "jog" ladder when standing on it.
8. Do not stand, climb or sit on braces or ladder top when used without extension portion.
9. Do not overload. Do not use as a brace, platform or plank.
10. Keep ladder close to work; avoid pushing or pulling off to side of ladder.

FOR SCAFFOLD USE

1. Follow instructions on scaffold plank.
2. Do not place plank above second rung from top.
3. Secure plank to ladder before each use.
4. Secure or guy ladder to prevent excessive movement.
5. Use properly secured third ladder to access plank.

PROPER CARE AND STORAGE

1. Store ladder in safe and dry place.
2. Properly secure and support ladder while in transit.
3. Never store materials on ladder.
4. Keep ladder clean and free of all foreign materials.

Marking No. 14

SAFETY FIRST

EXTENSION TRESTLE LADDER - FOR YOUR SAFETY READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken ladder, all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight, steps and rungs secure,spreaders function properly.
3. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL LADDERS CONDUCT ELECTRICITY. Do not let ladders of any material come in contact with live electrical wires.
2. Make sure ladder is fully open and spreaders secure.
3. Place on a firm surface and a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height. Do not place in front of door opening toward ladder.
4. Always attach guy lines to insure stability before climbing on extension section or positioning plank. See other labels for guy line instructions. IMPORTANT! STEEL CABLE CONDUCTS ELECTRICITY. DO NOT USE IF WORKING NEAR ELECTRICAL CURRENT. USE HEMP GUY LINES INSTEAD.

PROPER CLIMBING AND USE

1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set up and unattended.
3. Face ladder when climbing up or down; keep body centered between side rails.
4. Maintain a firm grip. Use both hands in climbing.
5. Never climb ladder from the side unless ladder is secured against side-wise motion.
6. Do not over reach, move ladder when needed.
7. Do not "walk" or "jog" ladder when standing on it.
8. Do not stand, climb or sit on braces or ladder top when used without extension portion.
9. Do not overload. Do not use as a brace, platform or plank.
10. Keep ladder close to work; avoid pushing or pulling off to side of ladder.
11. Do not use this ladder in high winds or storms.

PROPER CARE AND STORAGE

1. Store ladder in safe and dry place.
2. Properly secure and support ladder while in transit.
3. Never store materials on ladder.
4. Keep ladder clean and free of all foreign materials.

Marking No. 15

SAFETY FIRST

COMBINATION LADDER - FOR YOUR SAFETY READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools per side on 2-man stepladders or only one person, plus materials and tools on step or single ladders not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken ladder, all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight, feet , steps and rungs secure, spreaders function properly.
3. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL LADDERS CONDUCT ELECTRICITY. Do not let ladders of any material come in contact with live electrical wires.
2. Place on a firm level surface with a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height. Do not place in front of door opening toward ladder.

PROPER CLIMBING AND USE

1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set-up and unattended.
3 Face ladder when climbing up or down; keep body centered between side rails.
4. Maintain a firm grip. Use both hands in climbing.
5. Do not over reach, move ladder when needed.
6. Do not "walk" or "jog" ladder when standing on it.
7. Do not overload. Do not use as a brace, platform or plank
8. Keep ladder close to work; avoid pushing or pulling off to the side of ladders.

AS A STEPLADDER

1. Make sure ladder is fully open, spreaders secure, pail shelf in position.
2. Do not stand, climb or sit on pail shelf, braces or back section, or higher than 2nd step from ladder top.

AS A SINGLE OR EXTENSION LADDER

1. Set single or extension ladder at proper angle (75-1/2 degrees) by placing ladder base a distance equal to 1/4 total working length of ladder away from base of vertical support If distance is less than 3 ft., place base of ladder a minimum of 3 ft. from vertical support.
2. Do not stand closer to the top than 3 ft. from the top Never climb above the support point.

AS AN EXTENSION LADDER

1. Extend top section only from ground, never by "bouncing" or from the roof.
2. Securely engage ladder locks before climbing. Check that top and bottom ends of ladder rails are firmly supported.

PROPER CARE AND STORAGE

1. Store ladder in safe and dry place.
2. Properly secure and support ladder while in transit.
3. Never store materials on ladder
4. Keep ladder clean and free of all foreign materials.

Marking No. 16

CAUTION

MANUFACTURER'S INSTRUCTIONS AND/OR GRAPHICS DEPICTING LOCKING MECHANISMS

MANUFACTURER'S GRAPHICS SHOWING USES/POSITIONS

Marking No. 17

SAFETY FIRST

PLATFORM LADDER - FOR YOUR SAFETY READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken ladder, all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight, feet, steps and rungs secure, spreaders function properly.
3. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL LADDERS CONDUCT ELECTRICITY. Do not let ladders of any material come in contact with live electrical wires.
2. Make sure ladder is fully open and spreaders secure.
3. Place on a firm surface and a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or scaffolds to gain additional height. Do not place in front of door opening toward ladder.
4. If equipped with casters, lock in proper position before climbing.
5. If equipped with outriggers, position per manufacturers instruction before climbing.

PROPER CLIMBING AND USE

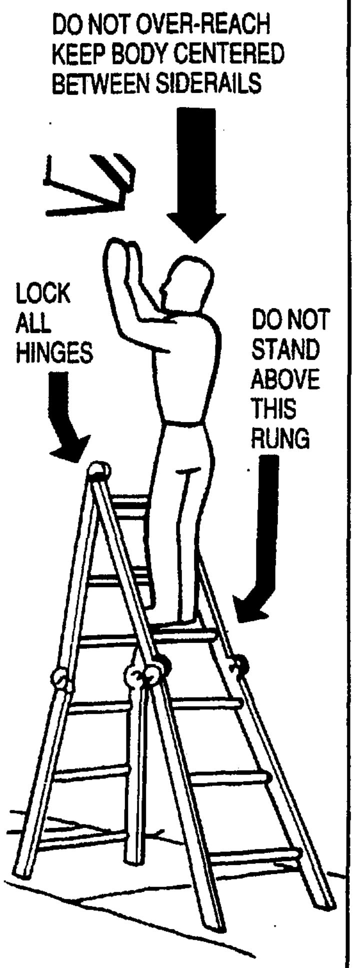
1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set up and unattended.
3. Face ladder when climbing up or down; keep body centered between side rails.
4. Maintain a firm grip. Use both hands in climbing.
5. Never climb ladder from the side unless ladder is secured against side-wise motion.
6. Do not over reach, move ladder when needed.
7. Do not "walk" or "jog" ladder when standing on it.
8. Do not stand, climb or sit on braces or ladder top when used without extension portion.
9. Do not overload. Ladders are meant for one person. Do not use as a brace, platform or plank.
10. Keep ladder close to work; avoid pushing or pulling off to side of ladder.

PROPER CARE AND STORAGE

1. Store ladder in safe and dry place.
2. Properly secure and support ladder while in transit.
3. Never store materials on ladder.
4. Keep step stool clean and free of all foreign materials.

Marking No. 18

CAUTION



SET ALL FOUR FEET
ON FIRM LEVEL SURFACE

WEAR SLIP-RESISTANT SHOES

READ ADDITIONAL
INSTRUCTIONS ON LADDER

Marking No. 19

DANGER

THE LOCKING MECHANISM MUST BE ENGAGED BEFORE USING LADDER

MANUFACTURER'S INSTRUCTIONS FOR USE

HINGE OPERATION

MANUFACTURER'S GRAPHIC DRAWING

LOCKED

MANUFACTURER'S GRAPHIC DRAWING

UNLOCKED

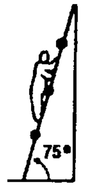
ADDITONAL INSTRUCTIONS FOR PROPER CARE AND USE OF THE LOCK/HINGE MECHANISM ACCORDING TO TYPE EACH MANUFACTURER EMPLOYS IN THE LADDER.

Marking No. 20

DANGER

USE LADDERS ONLY IN POSITIONS SHOWN

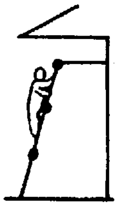
USE IN ANOTHER POSITION MAY RESULT IN DEATH OR SERIOUS INJURY



STRAIGHT LADDER

STEP LADDER

DOUBLE LADDER



OVERHANG LADDER

SHORT STEP LADDER

ADDITIONAL POSITIONS MAY BE ADDED ACCORDING TO THE CAPABILITIES OF EACH PRODUCT THAT MEET APPLICABLE TEST PROTOCOLS AND SPECIFICATIONS OF THIS STANDARD

Marking No. 21

SAFETY FIRST

ARTICULATED LADDER - FOR YOUR SAFETY READ CAREFULLY

PROPER SELECTION

1. Select ladder of proper length to reach working height.
2. IMPORTANT: Ladders are designed to support one person plus materials and tools per side on 2-man stepladder positions or only one person plus materials and tools on all other positions not more than the working load on the notice sign on this ladder.
3. Select ladders within the following:

TYPE	DUTY RATING	WORKING LOAD
IA	INDUSTRIAL-EXTRA HEAVY	300 lbs.
I	INDUSTRIAL-HEAVY	250 lbs.
II	COMMERCIAL-MEDIUM	225 lbs.
III	HOUSEHOLD-LIGHT	200 lbs.

INSPECTION

1. Inspect upon receipt and before each use, never climb a damaged, bent or broken ladder, all working parts must be in good working order.
2. Make sure all rivets and joints, nuts and bolts are tight, feet, steps and rungs secure, all hinges function properly.
3. Keep ladder clean, free from grease, oil, mud, snow, wet paint and other slippery material. Keep your shoes clean, leather soles should not be used.
4. Never make temporary repairs of damaged or missing parts.
5. Destroy ladder if broken, worn or if exposed to fire or chemical corrosion.

PROPER SET-UP

1. DANGER! METAL LADDERS CONDUCT ELECTRICITY. Do not let ladders of any material come in contact with live electrical wires.
2. Upon receipt lubricate all hinges with light machine oil, TRI-FLOW® or similar substance and again at least once a year depending on use.
3. Securely engage ladder hinges before climbing.

Proper operation of hinges is as follows:

A. To Lock

MANUFACTURER'S SPECIFIC INSTRUCTIONS HERE

B. To Unlock

MANUFACTURER'S SPECIFIC INSTRUCTIONS HERE

4. NOTE: FOR LADDERS HAVING HINGES EQUIPPED WITH LOCKING DOGS: it may be difficult to unlock hinges if there is pressure on the locking dog. To relieve the pressure, simply jiggle one half of the ladder back and forth until locking dog can be moved without force.
5. Adjust all hinges before climbing or using ladder. Never release the hinge locks or attempt to reposition hinges while working on the ladder.
6. Place on firm level surface with a secure footing. Do not use on slippery surfaces. Do not place on boxes, unstable bases or on scaffolds to gain additional height. Do not place in front of door opening toward ladder.
7. Where possible, use second person to hold ladder.
8. Set single or extension ladder at proper (75-1/2 degree) angle by placing ladder base a distance equal to 1/4 total working length of ladder away from base of vertical support.
9. Erect ladder with minimum 3 ft. extending above roof line or working surface; tie top at support points.

PROPER CLIMBING AND USE

1. DO NOT USE LADDERS if you tire easily, are subject to fainting spells, are using medicine or alcohol or are physically impaired.
2. To protect children, do not leave ladder set up and unattended.
3. Make sure all hinges are securely locked before climbing. Check that top and bottom ends of ladder rails are firmly supported.
4. CAUTION: A 2" x 10" construction grade lumber plank or better must be used in all approved horizontal positions where indicated.
5. Face ladder when climbing up or down, keep body centered between side rails
6. Maintain a firm grip. Use both hands in climbing.
7. Never climb ladder from the side unless ladder is secured against side-wise motion, or climb from one ladder to another.
8. Do not stand closer to the top than 3 ft. from the top. Never climb above the top support point
9. Do not use ladder in high winds.
10. Never pull the hinge release levers and operate hinges when standing on the ladder
11. Cover up hinges during messy work. Obstacles in hinge will destroy its function.
12. Never climb a ladder from the side unless ladder is secured against side-wise motion.
13. Do not over reach, move ladder when needed.
14. Do not "walk" or "jog" ladder when standing on it.
15. Do not overload
16. Keep ladder close to work; avoid pushing or pulling off to the side of ladders

PROPER CARE AND STORAGE

1. Keep hinges free of foreign materials that could destroy its function.
2. Store ladder in safe and dry place.
3. Keep ladder clean and free of all foreign materials
4. Lubricate mechanism of hinges regularly.

Marking No. 22

NOTICE

Ladder Size

Type and/or Duty Rating

Maximum Working Length (If extension Ladder)

Highest Standing Level

Total Length of Sections (If extension Ladder)

Model Number or Name

Manufacturer or Distributor Name

Manufacturing Plant (If multi-plant organization)

Month and Year of Manufacture

ANSI Standards Compliance

Warranty If Warranty Offered

Marking No. 23

Illustrations courtesy of Holly Label Co.

Appendix C - Data Gathering Forms

The following data gathering forms were developed by the A14 Testing task Force to obtain meaningful information for validating and revalidating the ladder standard requirements. Having used the forms with remarkable success, the A14 Committee wished to share the beneficial results produced by the forms with the users of the ladders.

The ladder use survey basically provides a profile of ladder user habits, so that incorrect practices can be corrected by self instruction or be addressed in more formal training efforts. The second form, the bi-level injury report, is used to determine from the fall victim the various factors surrounding the injury. These forms can be used separately or together, since the survey questionnaire identifies fall victims for later investigation.

These forms may be regarded merely as a starting point or framework. Modification of the basic forms to provide information more pertinent to a particular operation is also suggested. They are offered not only to assist in injury investigation, but to stimulate spin-offs or other, better investigative forms and tools to learn more about the causes of ladder injuries.

LADDER USE SURVEY

I live in a(n)
______ apartment
______ condominium
______ home

______ one story
______ two stories
______ more than two stories

______ weight
______ height
______ age
______ sex

1. I use ladders:
______ once a week or more ______ once a month ______ seldom

2. What types of ladders do you own?

	Wooden:		Metal:	
Stepladder:	______ size	______ age	______ size	______ age
Extension ladder:	______ size	______ age	______ size	______ age
Combination ladder:	______ size	______ age	______ size	______ age

3. What ladder accessories do you own?
______ top stand-off
______ bottom leveler
______ ladder jacks and extension planks
Other, please list:
______ none

4. Are any of your ladders damaged?
______ yes, please describe: ______________________________
______ no
Have you used the damaged ladder?
______ usually ______ occasionally ______ never

5. Have you ever used a ladder with supports to make it taller or level?
______ yes, to make it taller
How often? ______ usually ______ occasionally
______ yes, to make it level
How often? ______ usually ______ occasionally
______ yes, on soft ground
______ no

6. Have you used a metal ladder when doing live electrical work or near exposed wiring?
______ usually ______ occasionally ______ never

7. Have you USED a ladder horizontally or in another position for other than climbing?
______ yes, please explain: ______________________________
______ no

8. Have you ever read the instructions on the label of your ladder(s)?
______ yes
______ no
______ doesn't have a label

9. Have you ever fallen from a ladder?
______ yes, an extension ladder
______ yes, a stepladder: ______ indoors ______ outdoors
______ yes, a combination ladder: ______ indoors ______ outdoors
______ no

10. Do you use a ladder in your occupation?
______ yes, an extension ladder
______ yes, a stepladder
______ no

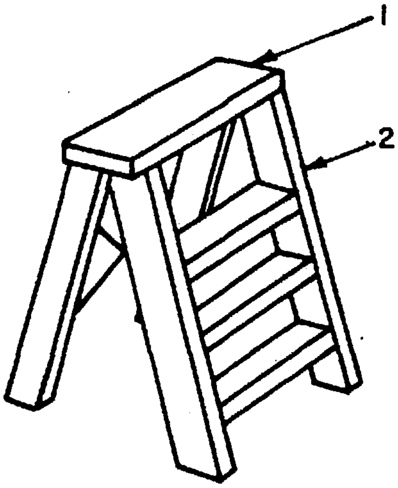
STEPLADDER

11. Have you climbed the back of a stepladder?
______ usually ______ occasionally ______ never

12. Have you stood on the bucket shelf of a stepladder?
______ usually ______ occasionally ______ never

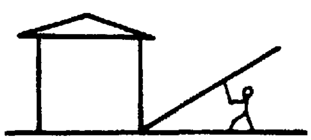
13. Have you used a CLOSED stepladder by leaning it against a wall?
______ usually ______ occasionally ______ never

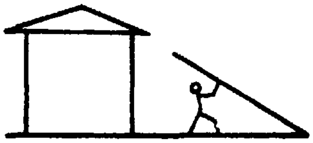
14. Have you stood on these positions of a stepladder?
position 1: ______ to stand on
______ to climb higher
position 2: ______ to stand on
______ to climb higher
______ neither position



EXTENSION LADDER

15. How do you position an extension ladder?

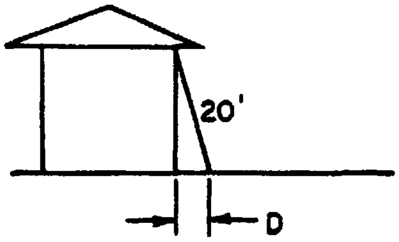

______


______

Other position, please sketch:

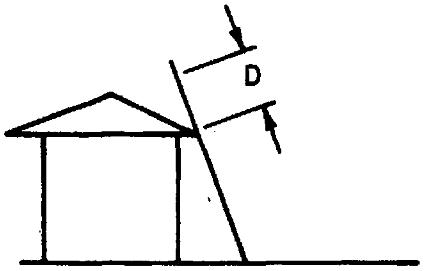
16. Do you position an extension ladder:
______ by myself
______ with help

17. How many feet (D) from the wall would you place this extension ladder?



______ 3 feet
______ 4 feet
______ 5 feet
______ do not know
______ 6 feet
______ 7 feet
______ 8 feet

18. Have you used an extension ladder to climb on the roof?
______ yes
______ no
If yes, does it extend beyond the roof eaves a distance of "D"?
______ less than 1 foot
______ 1 foot
______ 2 feet
______ 3 feet
______ more than 3 feet



19. Do you use a rope to extend the top section of your ladder?
______ usually ______ occasionally ______ never

20. Do you have difficulty in extending your ladder?
______ yes, too heavy
______ yes, locks malfunction
______ no

(continued)

21. **Do you tie the top of an extension ladder to prevent movement?**
______ usually ______ occasionally ______ never

22. **Do you block or tie the bottom of an extension ladder to prevent movement?**
______ usually ______ occasionally ______ never

23. **Do you stand on the top rung of an extension ladder?**
______ usually ______ occasionally ______ never

24. **Do you usually move an extended ladder along a wall by:**
______ sliding it to the slide
______ standing it vertically and moving extended ladder
______ closing extension and then moving ladder

25. **How do you store an extension ladder?**
______ floor
______ hang, please explain:

BI-LEVEL FALL VICTIM REPORT

This questionnaire is in five parts:

A. Personal conditions at time of ladder fall
B. Identification of ladder involved in fall
C. Conditions of site where fall occurred
D. Activity of climber at time of fall
E. Condition of ladder before and after fall

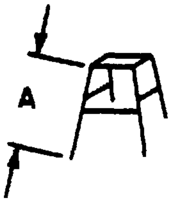
Part A – Personal Conditions at Time of Ladder Fall

1. Personal data at time of fall:
   Sex: ______ Male ______ Female Age ______ Date of fall ______
   Weight ______ Height ______ Right handed ______ Left handed ______
   Education: ______ Grade school ______ High School ______ College
   Occupation: ______ Office ______ Farmer ______ Service
   ______ Trade/Craft ______ Household/Retired
2. Physical limitations before fall:
   ______ None ______ Sick ______ Using medication
   ______ Handicapped (trick knee, eyeglasses, foot or back problems, etc; explain)
3. How long were you using ladder when the fall occurred?
   ______ 0–1 hours ______ 2–4 hours ______ 5–8 hours ______ 9–10 hours ______ 11 or more hours
4. Type of injury from fall:
   ______ Sprain ______ Fracture ______ Cuts ______ Bruises ______ None
5. Part of body injured:
   ______ Head/Neck ______ Back ______ Trunk. ______ Hand/Arm ______ Leg ______ Foot/Ankle

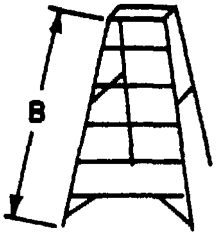
Part B – Identification of Ladder Involved in Fall

1. Material of which ladder was made:
   ______ Wood ______ Metal ______ Fiberglass
2. Type of ladder used:

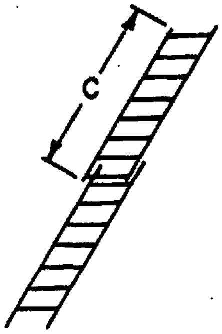
______ Stepstool
A = ______ feet



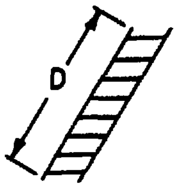
______ Stepladder
B = ______ feet



______ Extension
C = ______ feet



______ Straight
D = ______ feet



______ Combination
Indicate if used as stepladder or extension ladder and fill in appropriate dimension at left:
______ Stepladder
______ Extension

3. Estimate amount of time ladder was normally used in a 12-month period:
   ______ 1–5 hours ______ 6–12 hours ______ 13–20 hours ______ 21–30 hours
   ______ 31–40 hours ______ 40–80 hours More: ______________________________

(continued)

Part C – Conditions of Site Where Fall Occurred:

1. Location of site:
______ Inside ______ Outside

2. Weather (if applicable):
______ Dry ______ Windy ______ Rain ______ Snow cover ______ Clear

3. Ladder base support (can be more than one characteristic):
______ Soil ______ Grass ______ In shrubs ______ Gravel
______ Concrete ______ Blacktop ______ Tile ______ Wood
Other (explain): ______________________________

4. Condition of base:

	Yes	No
Level	______	______
Uneven	______	______
Slippery	______	______
Hard	______	______
Soft	______	______

5. Condition at top support (extension ladder only):
______ Gutter ______ Tree ______ Attic or loft
Wall: ______ Wood ______ Metal ______ Brick
Other: ______________________________

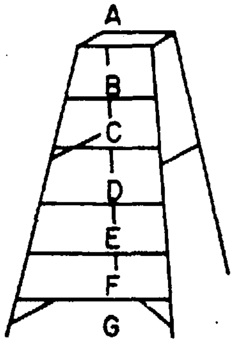
Part D – Activity of Climber at Time of Fall

1. What were you doing?
______ Painting ______ Cleaning ______ Pruning ______ Storing
Working on: ______ Roof ______ Wall ______ Gutter
Other: ______________________________

2. Height of work area (ceiling, shelf, window, tree branch, etc): ______ feet

3a. Stepladder:

When fall occurred I was:
______ Climbing down
______ Climbing up
______ Standing
______ Reaching up
______ Reaching to the side
______ Coming down to A from above
______ Going up from A to above



Location
on ladder.
______ A
______ B
______ C
______ D
______ E
______ F
______ G

Stepladder closed, leaning against:
______ Wall
______ Tree
______ Other

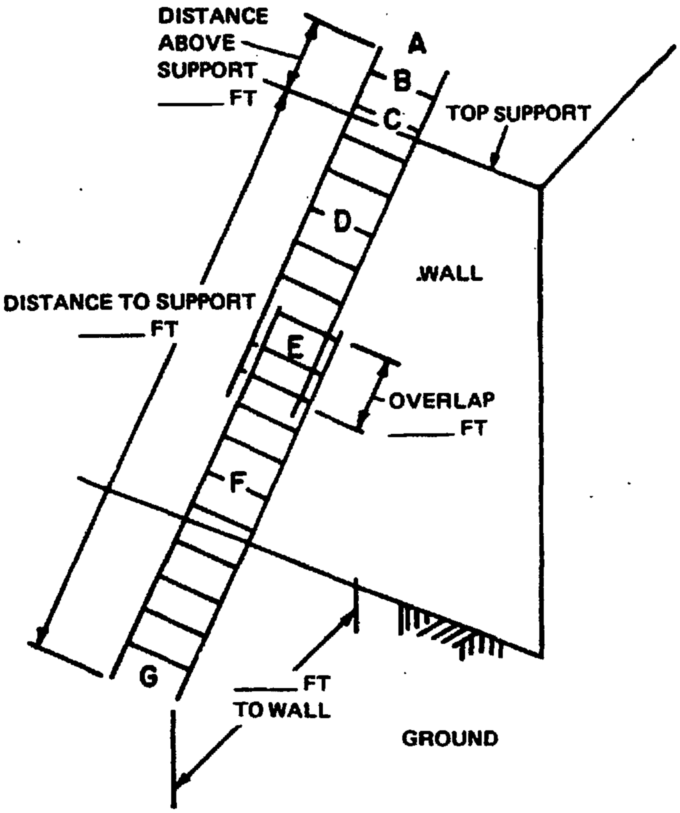
(continued)

3b. Extension ladder:

When fall occurred I was:
______ Climbing down
______ Climbing up
______ Standing
______ Reaching up
______ Reaching up the side
______ Coming off roof
______ Going on roof

Location
on ladder:
______ A
______ B
______ C
______ D
______ E
______ F
______ G

Extension ladder used as straight ladder:
______ Taken apart
______ Fully closed



4. What appeared to happen at the time of the fall?
______ Lost balance
______ Missed a step or rung
______ Ladder tipped
______ Ladder slipped at top
______ Ladder slipped at bottom
______ Step or rung broke
______ Ladder collapsed
______ Electric shock
______ Extension lock failed
______ Wind blown

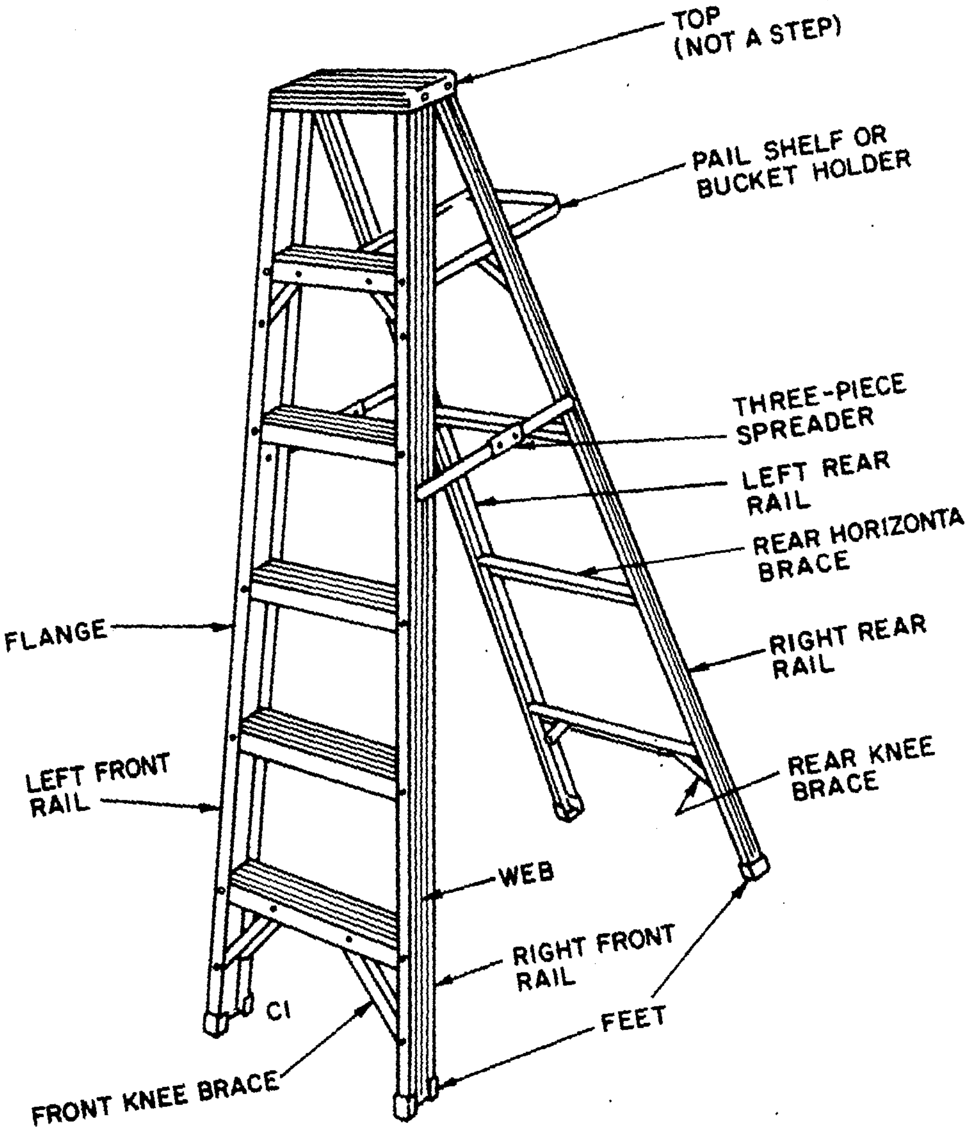
5: Personal assessment of the fall:

	Yes	No
Was using the right ladder for the job	______	______
Placed the ladder correctly	______	______
Read labels and other literature	______	______
Personal condition was a factor	______	______

(continued)

Part E — Condition of ladder before and after fall

1. Identification of stepladder damage (or combination ladder when used as stepladder):
   Place the following identification marks on sketch next to appropriate part:
   (A) Bent; (B) Broken; (C) Missing; (D) Malfunctioning
   (1) Before fall; (2) After fall
   For example, if the left foot was missing (C) before the fall (1), mark it "C1."



(continued)

2. Identification of extension or straight ladder damage (or combination ladder when used as extension ladder):

   Place the following identification marks on sketch next to appropriate part:

   (A) Bent; (B) Broken; (C) Missing; (D) Malfunctioning

   (1) Before fall; (2) After fall

   For example, if the left foot was missing (C) before the fall (1), mark it "C1."